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EDITORIAL.

Should Hospital Internes Be Paid?

The secretary of the Canadian Medical Association in his recent address to our Medical Society. which was published in the last issue of this journal, strongly advised all graduates who could afford it, upon graduation, to take a year's rotating internship in a hospital, and if they could not afford it, to take it anyway, thus intimating that an internship was such an essential part of the education of the medical man that no student of medicine could afford to do without it. This is the advice which we hear tendered to us on all sides by the leaders of the profession, and by successful medical men of long experience, and it is the advice which is almost invariably acted upon by the graduate.

Indeed, at least one year's internship is necessary before license to practise will be granted in many states of the republic to the south. The hospitals, realizing the importance of this training to the recent graduate, have arranged internships on the rotating basis, by means of which the interne gathers a large experience in many different branches of medicine, — experience gained by constant association with the patient himself, living under the same roof with him, and which could be gathered in no other way. Certainly this is a chance to perfect oneself in one's own profession which should not be neglected, whatever the sacrifice in time and money involved.

To the hospital the presence of the interne is indispensable. He must be there to look after emergencies, he is necessary in the painstaking investigation which modern medicine demands in the diagnosis of disease, he is capable of carrying out many of the technical procedures which would, save for the interne's presence, necessitate the employment of expensive technicians. In return for this service the hospital grants the interne experience, and maintenance.

The question arises, should the interne receive any payment for his services over and above maintenance? In the past this question has been settled in the various hospitals by the working out of the law of supply and demand. If the hospital finds that the training it offers is sufficiently good to attract men of the calibre it desires, who will work without payment, they pay nothing. If on the other hand the hospital cannot offer the intern the training that he could get at a better hospital, a small allowance is made to him to make up the deficiency. The medical mind has come to accept it for a fact that a hospital which pays has something wrong with it, and that a hospital which does not pay is more likely to be a good hospital. A hospital which desires to make itself attractive as a place for internship proceeds at once to announce that it does not pay its house staff. Occasionally one finds a hospital of high standing which realizes the injustice of taking without payment the services of a man who has just completed a long and expensive course of training, who is in most cases in debt

for his education, and they pay the interne enough to keep up appearances without running further into debt. However, they are careful not to advertise this fact. They "keep it dark," as if they were more or less ashamed of it.

This state of affairs is a crying injustice. The general public no longer tolerates the system of training of craftsmen which demand that a man's services be tendered free while he is perfecting himself in his trade. The apprentice system is as extinct as the dodo except in the medical profession where mediaeval economics still holds sway. The injustice to the medical workman is still further magnified by the fact that he has already spent approximately ten thousand dollars in making himself fit for his profession, and does not offer himself to the hospital an unskilled helper. In the past the ethics of the profession have prevented the graduate from demanding a just return for services which he tenders to hospitals, which, were it not for his eagerness to gain experience would cost these institutions vast sums.

Never before has the cost of a medical education been so great. Never before has such a long period of training been demanded of the aspirant to the profession. It is high time that this be recognized by the hospitals.. We feel that if the hospital authorities have the matter squarely placed before them by an organization representing the concerted opinion of the future graduates in medicine of the whole continent, sponsored by the responsible student bodies of their respective universities, they will readily consent to deal fairly with their applicants for internship. It may be some time before student opinion will compel the universal recognition by the hospitals of the unfairness of the present system, but we trust and hope that the time is not far distant.

Praecordial Pain*

G. Harvey Agnew, M.B. (Toronto)
Physician, Toronto Western Hospital

This subject is one of vital interest to all who practise general medicine, for "pain over the heart" is one of the most common complaints which bring patients to the office. It is also of paramount interest to our patients for they always associate such pain with the heart itself and they realize that with them, just as with the trans-Atlantic fliers, all depends on the motor.

Fortunately, many of these cases, on investigation, prove to be ones wherein we find nothing intrinsically wrong with the heart or the aorta. I like to think of patients who present themselves with praecordial pain as falling into three groups:

(a) Those with extra-cardiac origin.

(b) Those with a cardiac origin but in which there is a functional rather than a definite organic change.

(c) Definite cardiac or aortic pathology.

I like this viewpoint, for it clarifies the question of prognosis, and, after all, that is the phase of most interest to the patient. In trying to properly place the patients in one of these groups, one often finds the exact details of the patient's symptoms of great value. They often give us the correct diagnosis and, in those cases where our physical examination is negative, may be the only clues.

*Address given before the Annapolis Valley Medical Society, at Windsor, N. S., May, 1927.

I. Extra-Cardiac Causes.

Among the "extra-cardiac" causes of praecordial pain, one includes herpes zoster, pleurisy, intercostal neuralgia, mediastinitis and mediastinal tumor. Some of these like *herpes zoster*, soon reveal their true nature; *pleurisy* and *intercostal neuralgia* are definitely worse on respiration just as in angina pectoris, but they lack the other definite signs of angina pectoris to be discussed later. Why a mild intercostal neuralgia should be so prone to pick out this particular area rather than others is one of the many interesting vagaries of nature. *Mediastinal* changes are often confused with aneurysm. Here the pain tends to be constant, of a deep-seated dull nature and may be associated with cyanosis, inspiratory or expiratory difficulty and intercostal neuralgia. The physical examination, including palpation of the breast and axilla, is most important and X-ray examination may be necessary. A couple of years ago I saw a patient with praecordial pain due to mediastinal glands from Hodgkin's disease. The only external manifestation was a small group in one inguinal region.

The pain of *pulmonary embolus* is usually noted at either side, but may be substernal or praecordial. Pulmonary embolism or infarction may follow operation, fracture, childbirth, infections or right heart disease. It is usually very sudden in onset, is stabbing in nature, constant, and is accompanied by dyspnoea, bloody sputum, bronchial breathing, rales and frequently a friction rub. If the patient survives the initial shock, the condition is often erroneously diagnosed as a localized lobar pneumonia.

II. Functional Heart Disease.

The second group, those with a cardiac origin but of a functional nature, are very interesting. This group includes the overacting and hypersensitive heart of early hyperthyroidism, the "tobacco" heart, the premature beats and the palpitations of no clinical importance and the so-called "cardiac neuroses." Because of its frequency and because of its sociological and economic importance, we understand the *neurotic heart* very thoroughly. One is so frequently consulted by a very much alarmed individual who is quite certain that the heart is damaged. These people are frequently young, usually women, and are almost always overworked—or underworked. They do not complain of oedema nor of cyanosis. They have short sticking pains at the apex, their hearts flutter and pound with psychic disturbances—but they could dance all night! They can describe their symptoms with the greatest detail, their descriptions of their complaints are replete with fantastic similes; "My heart turns over and over like a clown!" They flush and perspire easily. If dyspnoea be present, the breathing is short and fast and the attacks are independent of exercise. They show very little discomfort after exercise and may completely forget their troubles for the time being.

Such pains have very little significance. These sharp sticking pains, especially if in the region of the apex, seldom indicate serious cardiac disease. Serious pain is usually substernal or at the base. As a general rule, pain from abnormal rhythms or premature beats has not the same significance as if due to structural pathology. There is one type of pain that we get in the effort syndrome, in hyperthyroidism, in mitral stenosis, and in other overacting sensitive hearts; this is a steady ache coming on some time after exercise and lasting for several hours. This is frequently found at the apex, and is very often confused with mild attacks of true angina pectoris. The age of the patient, the temperament, the physical examination and the personal habits would all have to be considered in clearing up the diagnosis.

III. Definite Cardiac or Aortic Pathology.

The third group is a most serious group. Here we get pericarditis, aortitis and aneurysm, coronary thrombosis and occlusion, acute dilatation of the heart and that most interesting of cardiac af-

fections—angina pectoris. *Aortic disease* usually gives a rather heavy pain or sense of pressure in the sternal region. This is somewhat steady, aggravated by exercise or excitement and, if aneurysm be present, is often of a boring nature. The radiation varies and is not of diagnostic value.

If this heavy dull pain be situated over the lower helf of the sternum, it suggests *coronary disease* rather than aortic disease. Such a pain is always of serious significance. The pain found in *hypertension* is located higher under the sternum as in aortitis.

The pain in *pericarditis* is rather variable. In the dry form it is usually sharply locallized to the heart area and may take the form of a keen perception on the part of the patient of the beating of his heart. Possibly the to-and-fro rub sets up a viscero-sensory stimulus of some kind. The dry form soon gives way to the moist or exudative type and then the pain may be in the nature of a feeling of oppression, due to the pressure of the fluid. Sometimes the pain is sharper and more stabbing and may radiate to the arms and neck. Pain in the liver region occurs occasionally, due to the fact that the distortion of the pericardium compresses the inferior vena cava and produces congestion in the liver. If the pericardial effusion be very great, the pressure on neighboring organs may give rise to dyspnoea, dysphagia, hoarseness and other symptoms.

The pain of *acute cardiac dilatation* is so closely associated with the usual symptoms of acute dilation, such as dyspnoea, cyanosis, cough, prostration, rapid, feeble, often irregular, pulse, etc., that the diagnosis of the cardiac dilatation is rather easy. This is especially so if there is an immediate history of physical strain, and one can percuss the wide right and left chambers. In these cases palpation of the apex impulse is of little value. The impulse is faint and diffuse and, in fact, this and the enlarged contour may even suggest the diagnosis of pericardial effusion. An associated condition occurs much more often than we diagnose in this country. Such patients occasionally have a sharp, steady pain in the upper abdomen. This is often taken for abdominal angina pectoris. A patient whom I had the privilege of seeing last summer had been diagnosed as a perforated gastric ulcer, the perforation being precipitated by the strain of catching a street car, and he was rushed to the hospital. What he really had was an acute dilatation of the heart and an *acute dilatation of the* liver. The liver margin was down and very tender, Glisson's capsule was stretched and what really did look like an acute perforation cleared up on rest, strophanthin and digitalis.

Angina Pectoris.

An attack of angina pectoris is one of the most terrifying experiences to which the human being is subjected. Coming, as it so often does, like a bolt from the blue, it assails its victim in his prime, fells him when he is least expecting it and forever shatters his morale, for he realizes that, sooner or later, do what he may, that terrible vice-like pain will assuredly return.

An odd feature of angina pectoris is that it is, in the majority of cases, a disease of brainworkers. On the public wards we see it very rarely—it is much more common in private practice. It is the most common single cause of death in our own profession. I am treading on dangerous ground when I add that it is comparatively infrequent in women. When Osler wrote his classical description based on some 340 cases, Wenckeback with a large cardiac practice in a rural community had seen but twenty-five cases. Later, on moving to Vienna, he soon began to pile up records, and by 1924 had nearly 1,500 cases. Apparently hard physical work does not predispose one to angina pectoris. Syphilis is not nearly as common a cause as we have believed. Without doubt the greatest etiological factor is arterioscelerosis—especially the large vessel type of sclerosis.

In this paper one should possibly not linger too long on the theories regarding the actual production of the pain.

I believe that eighty different hypotheses have been collected. MacKenzie thought that it was an expression of cardiac exhaustion—a viscero-sensory reflex and a viscero-motor reflex causing spasm of the intercostal muscles. Others have been impressed by the frequent marked coronary sclerosis; in those cases where a perfectly normal coronary wall has been found, they attribute the pain to coronary spasm. Allbutt has stated that while the pathological pictures are so divergent, one definite lesion—and one only—is common to all; namely, a diseased ascending aorta. Thus has arisen the Allbutt theory (and it is accepted by Wenckeback and other authorities) that we have in the great majority of cases a sudden tension of a hyperirritable aortic wall already weakened by inflammation or degeneration. One might be very close to the truth if we look upon angina pectoris as a symptom due to several causes—coronary sclerosis and myocardial disease in some cases and aortic disease in others.

The typical picture of angina pectoris is one not readily forgotten. It comes on after running for a street car or cranking a motor; after shovelling snow or walking against the wind; after a heavy meal or even a wave of anger. The patient is suddenly seized with pain—toothache and earache are as nothing by comparison. He stands quite still—he dare not move. His left arm is crooked and fixed—he scarcely breathes. His eyes are fixed; he is afraid to speak. The textbooks speak of the "sense of impending dissolution"; Price describes it to his clinic as "the agony of death without the relief of death." The pain may be praecordial, retrosternal, or referred to the epigastrium, the neck, the shoulder, down the left arm (or the right!), the occiput or the scapula.

Such a case is easy to diagnose. Much more diffcult is the case where the pain is only felt in the shoulder, the fingers or arm, or the epigastrium. In these milder cases the onset may be gradual rather than sudden, and it may be only a numbness or a slight discomfort. These are the cases that are missed and I have made it a rule when examining a patient with "neuritis," say, of either arm or shoulder, to enquire if the pains are *made worse by exercise.* such a history should always put one on one's guard.

Another help in diagnosis is the heart action. In true angina pectoris the beat is normal and steady; the rhythm is undisturbed. The myocardium is functioning unusually well. In fact, one might safely say, that if a patient has a chronic heart disease and auricular fibrillation, he is extremely unlikely to develop angina pectoris. There is no oedema in angina pectoris, no dyspnoea, no cough, no ascites. The first sound may be softened, murmurs may be absent and the blood pressure is but moderately raised.

Coronary Occlusion.

The disease with which angina pectoris is most often confused is *coronary occlusion* from the thrombosis or embolus—a lesion that should be diagnosed more often than it is. This may arise from endocarditis, coronary disease, septicaemia, etc., quite independently of angina pectoris, or may be a terminal stage of the latter. Here also the onset of the pain is quite sudden as a rule, but the pain is localized more to the heart and the attacks last longer. They are not relieved by nitrites and even morphia is barely sufficient. The patient is dyspnoeic, his pulse is small and fast and the blood pressure falls. The patient is in a state of collopse.

A point about the prognosis may prove apropos. The patient with angina pectoris is usually free of distress between attacks—the one with a coronary occlusion, if he lives at all, remains weak and dyspnoeic on exertion. This is due to the ventricular wall being weakened by the infarct. One occasionally sees aneurysms of the heart wall from this cause and recently I saw a ventricle that was so thin in one area that it was actually translucent.

Observations.

This is a rather sketchy review, I fear, of the more frequent causes of pain in the region of the heart. After all, praecordial pain is only a symptom and every one of us must be a Sherlock Holmes in ferretting out the underlying cause. This applies especially to the so-called "cardiac neruroses." These people need reassurance, not a doleful confirmation of their blackest fears. We have all opined that "Yes, there might be a little damage there" and later have been horrified to get a round-about distorted report that we had assured so-and-so that she couldn't live a year! A faltering or pessimistic opinion may doom an impressionable young person to a lifelong semi-invalidism. On the other hand, if the condition warrants that a business man should get his affairs in order, it is decidedly unfair not to tell him, or at least, his family. It is obvious that an exact diagnosis of the cause of praecordial pain should be made for the sake of the patient.

An Introduction to the Study of Functional Nervous Disorders*

(By H. Hetherington, B.A., 2T8)

In the study of nervous affections, the division of such disorders in to Organic and Functional has been recognized, and while these groups touch and mingle so that no accurate boundary can be drawn between them, the division is no less practical and necessary.

In the first group distinct anatomical lesions are found which may account for part, if not all, of the peculiar manifestations. In the second group is found an extensive array of disturbances, characterised by diminution or increase in sensory and motor power, or by a variety of other phenomena in which we find no evidence of an organic change, either in the nerve itself, or in any part of the Central Nervous System.

Functional Nerve Diseases may be broadly grouped into three classes. The first group, the Neuroses, are Functional Nerve Diseases due to some physical origin. In this group are included the Neurasthenias. The second group, the Psychoneuroses, have a mental origin. While in the third group are included the Psychoses, or Insanities. Many authors combine the first two groups as Neuroses. In this group the patient is living in the real world, and while its difficulties are greater for him than for normal people, they are the same difficulties that all of us have. The Psychotic lives, as far as he is a Psychotic, in the world of phantasy. His difficulties arise from the fact that he is living in another world which is not subject to the same physical laws as this one.

In studying the Etiology of the first group of Nervous Diseases, i.e., the Organic, in case of degeneration of any part of the nervous system, should the causal factor be found, the degenerated structure may not resume its normal function. On the other hand in Functional Nerve Disease, if the cause, whether it be hypothetical or not, is removed there is reasonable hope that the normal function may be resumed.

The Etiological Factors may be presented as, firstly, predisposing factors, which although not sufficient to originate a Neurosis by themselves, may cause it to continue if once excited. Secondly, immediate factors, which would not cause prolonged nervous disease, but which frequently act as the spark to set the disease going. Thirdly, modifying factors, which, when present, are an aid in producing the breakdown of an already weakened nervous system.

The most prominent predisposing factor is that of Heredity. In many people there is an inborn tendency to neuro-

*(A paper read before the "Group of Eight" Reading Club on November 7, 1927.)

pathic conditions. This neuropathic tendency is a physical affair. Each individual receives a germinal structure which confers a predetermined degree of plasticity to receive impressions and to react to them in a particular fashion. The emotional reactions, the character and personality of the individual depend upon the inborn structural pattern of his nervous system. The congenital tendency to neuropathic conditions does not depend upon the mental development of the individual. It occurs with sub-normal, normal or superior mentality. The particular type of neurosis developed is the individual reaction of the neuropathically inclined person to various factors which are mentioned below. As a matter of fact we are all potential neurotics, for the strongest nervous system will break down if the strain be great enough.

Suggestion as an Etiological Factor may be prolonged or immediate. Suggestion to define it, is to cause the acceptance without criticism of a communicated proposition in the absence of reasonable grounds for its acceptance. Suggestibility varies even in normal individuals. It is increased in children and also during emotions. In the production of a neurosis, a harmful suggestion commonly acts by perpetuating some symptom which has already arisen as a transient, natural reaction to bodily pain or injury, or to a physical trauma. The reaction is evanescent in the normal individual, e.g., immobilization of a limb after a painful injury. In Hysteria it persists as an imagined habit and gathers additional symptoms around it. Suggestions may arise either from within, auto-suggestion, or without, hetero-suggestion.

Auto-suggestion may act at two different periods after a violence such as an accident. The patient may find himself blind or deaf, etc., due to exhaustion or cerebal concussion with mental confusion. With his suggestibility heightened by fear, surprise and distress give rise to super-added suggestions which intensifies and fixes the new symptoms. It may take origin in the awakening of an old memory of similar disability in the patient's, his relatives', or friends' former existence. In these cases there may be a period of hours or days before symptoms appear in hysterical form. This is called the "meditation period" and this meditation need not be conscious to be effective in producing the neurosis.

Hetero-suggestion is also an important factor in the causation of neuroses. It is well known that the placing of hysterical patients in wards with similar patients is not beneficial since it focuses the attention of the individual on his own symptoms. Injudicious friends and visitors have a harmful effect on the condition of neurotic patients, as does the improper questioning by well-meaning physicians or students. The suggestion of reward or compensation, be it from others or arise in the mental processes of the individual, often causes the symptoms to persist as long as future compensation is likely to be forth-coming.

Emotional shock is an immediate cause of many neuroses. Emotional activity with its accompanying bodily and mental reactions is normally associated with the mechanism for the preservation of the occurence which caused the particular emotional reaction leads to the fading of the emotional tone, so that after a considerable time the occurence will not cause such an intense emotional tone as formerly, or, in other words, "familiarity breeds contempt." If the emotional reaction is uncontrolled or imperfectly controlled so that normal bodily and mental reaction do not take place a neurosis is liable to develop. The memory of an emotion, in such a case, as well as the emotion itself may aggravate the neurosis or cause the symptom to reappear. If the repression of painful memories be incomplete, the patient, especially if he has neuropathic tendencies, fails to adapt himself to the surroundings and the memories are distorted and exaggerated and they aggravate the nervous symptoms. This is more likely to occur when the atten-

tion is not fixed or the control of waking state is relaxed.

Physical shock is an important but rather infrequent immediate cause of a neurosis. This may occur after accidents or a fall or blow on the head. In these cases there may be a sudden cerebral anemia accompanied by microscopic petechial hemorrhages and cerebral oedema. The cerebro-spinal fluid shows increase in albumen, a slight excess of lymphocytes, and even a few red cells. The clinical phenomena are probably due to molecular change in brain cells which are not demonstrable. Sometimes these symptoms are evanescent, but often they are permanent, witness the intolerance to alcohol following severe head injuries.

Excessive bodily or mental strain may cause a neurasthenia or exhaustion psychosis of the confusional type. Exhaustion also lowers the individual's resistance to other factors, i.e., suggestion, emotional shock, etc., which are the immediate antecedents of the neurosis. Strain is rarely a sole cause but is usually combined with some emotional factor in the causation of neuroses.

Toxic conditions are also conducive to the formation of neuroses in neuropathically inclined individuals. Endogenous causes of intoxication such as acute, enteric, or malarial fevers, are often a frequent starting point of a neurasthenic state. Disordered internal secretions in many cases, especially in women at puberity and the menopause are a potent source of neurotic conditions. The habitual taking of drugs such as opium and alcohol, or even the milder drugs as tea, coffee and tobacco, may produce marked nervous symptoms.

Localised trauma, or disease associated with pain diminish the patient's emotional control. They may induce an unpleasant emotional feeling-tone with subsequent obscure fears, especially when reinforced by auto-suggestion, focussing the patient's attention on that special part. These factors are important features in the formation of traumatic neuroses.

It will be of interest here to discuss the theories of the various investigators as to the cause of the neuroses. For upon these various theories depend to some extent the treatment to be given.

Janet was among the first to proscribe Functional Nerve Disease to a psychic cause. He believed that neuroses were primarily due to the lowering of the nervous or psychic tension, accompanied by an exhaustion of the higher functions of the brain. He divided mental operations into two classes. The first had to do with abstract ideas, memories and imaginations not immediately related to our actions. The second type he called the "function of the real" having to do with the world of present sense impressions and the reactions by which we seek to modify the world as it appears to us. This latter type of mental operation is the more difficult of the two because of the greater complexity of the elements being built into it. Thus it requires a higher level of psychic attention than the first type and will be the first to fail. This theory is unsatisfactory it ascribes all neuroses to mere oscillations of the level of the psychic tension, nor does it account satisfactorily for all the symptoms of the psychoneuroses. The process as described is too purely mechanical and does not give enough importance to the forces within the organism itself.

The Freudian conception of the neuroses is closely linked up with the idea of "libido." According to this school the term Libido represents a craving analagous to hunger which needs and seeks satisfaction from birth to old age. They have built up a history of the mental life of man with this idea of libido as a basis. It is briefly as follows. The infant is interested in the sensations of its own body, especially those parts which Freudians call the "erotogenic zones," i.e., the mucous membranes of the mouth, anus, and genitals. Hence the satisfaction the infant derives in sucking, defecation, etc. A little later it falls in love with its mother and the act of sucking becomes an act of love. Furthermore, it becomes jealous of its father and will be-

gin to hate him. This is the Oedipus state, which, if carried into adult life, will become Oedipus complex. Still later the man develops a love for himself, the so-called Narcissism or auto-erotic stage. Finally there is the adult stage where the love object is an adult of suitable age of the opposite sex. In adult life the part of the libido which has escaped repression or sublimation becomes centred in channels which provide satisfaction for the normal love-life of the individual. If any hindrances to the outflow of this craving occurs there is a damning back of the libido into earlier channels and it revives earlier tendencies. These unconscious wishes are thrust into consciousness and meet with the whole of the moral and aesthetic nature of the individual. These wishes are repressed and a complex occurs, or the earlier tendencies break forth in a distorted form. Hence to the Freudians the specific cause of the neuroses is the unconscious residue of infantile sexuality.

From the teachings of Freud certain other schools arose, the most noticeable of which is that of Jung. Jung does not ascribe repression solely to the deprivation of love and normal sexual satisfaction. His meaning of "libido" includes every form of interest and striving; it is a psychical energy that drives us forward. Hence repression occurs when there is failure to achieve any task which life may bring us. Thus it is failure in adaption to life rather than "libido" satisfaction that forms the starting point of an introversion leading to a neuroses.

There is one further writer who should be mentioned, namely, Adler. Adler holds that neuroses occur because of an attempt to obtain compensation for some inferiority. The life of an individual with an organ deficiency is concentrated on the desire to seek security from the consequences of the inferiority and to find compensation for the feeling of incompleteness which such inferiority engenders. The patient's life is one of desire for superiority and mastery. He sets some fictitious goal which is untenable and his energies are deflected from the realities of life and spend themselves on a feeling of security and sense of power. The symptoms are the defences which the neurotic puts up to assure himself against the consequences of his inferiority and to increase his power over his fellows.

Nothing is more vague than the definition of the neuroses, and when one attempts to classify them one is confronted by almost insurmountable difficulties. In looking over the literature one is struck by the variety of classifications. Each author groups the neuroses in a different manner, and even the terminology is different in many cases. For the purpose of discussing the treatment we will mention the two groups of neuroses which are commonly referred to in speaking of psychotherapy, namely, Neurasthenia, or anxiety neuroses, and Hysteria.

Neurasthenia is a condition characterized by a series of symptoms which arise from a faulty adaption to the strains and stresses of life. In this condition the patient reacts to the environment by overaction. It is not merely an intellectual and physical fatigue that causes such a patient to become neurasthenic, but also some associated emotional state to which the patients have overacted. But there are other patients who, without over-work or without an emotional strain, fall into a state of fatigue or exhaustion which seems inexplicable. To all these types of patients the term neurasthenia is used.

On the other hand a state of hysteria is produced in a patient who meets the difficulties of life by underaction, or without action at all. It is the superior ego of the patient which is weak and allows the automatism of the patient a certain freedom and renders him very suggestible.

The therapeutics of functional nerve disease was, in its infancy, symptomatic, just as the early therapeutics of medicine itself. But medicine no longer attacks the symptom. It concerns

itself only with the actual causes of the diseases it has to treat. Specific therapy has taken the place of symptomatic treatment. Hence it is not logical to treat functional nerve disease other than by psychic means. Drug therapy may have its uses in dealing with additional symptoms not due to psychic cause, but the time has past when one could claim to do a good piece of work by saturating the patient with phosphates or bromides. To a certain extent drug therapy may be considered as a psychotherapy, but in the wrong sense of the word. Its advocates say that it will help through suggestion. If one can persuade one's patient that such and such a medicine will relieve the symptoms, it will probably benefit the patient. But the benefit is only temporary, for after a time the patient will feel that, on the whole, he is no better. Hence much valuable time will be lost and in addition the patient will lose confidence in the physician and his medications.

Wier Mitchell was one of the first to make a serious attempt to treat these patients. His theory was that such patients were suffering from an exhaustion of the nervous system. They were easily fatigued; they had no energy to digest their food, and the heart was irritable for the same reason. Hence a vicious circle was established and was capable of continuing indefinitely. He noticed that such people were extremely thin; their hearts were weak and erratic, and they were anemic. In fact they were physically ill similarly to patients ill of pneumonia or any other systemic disease. But he failed to see that these phenomena may have a psychic cause. His treatment was in brief, to keep the patients rigidly in bed; to feed them in such a way as to build up their nutrition and bodily weight. They were massaged to prevent flabby muscles, they were separated completely from friends and relatives to ensure absolute mental rest. By this method Wier Mitchell cured hundreds of cases and, indeed, many of his earlier cases remained permanently cured. But as the past and his enthusiasm waned the number of cures dropped off. The fact is that it was the personality of the physician and his utter confidence in the success of his treatment that cured the patient as much as the treatment itself.

The reflex view of the causation of functional nerve disease has been cropping up from time to time in various disguises. The point of origin of the reflex varies with the special surgical interest of the day. Formerly in the early days of gynaecology, symptoms were cured when women were treated for some supposed affection of the uterus. Erosions were treated currettings were done, pessaries were worn, and the patients were relieved. But these practises gradually passed away and another organ took the place of the uterus. For a time minor astigmatic errors of refraction were relieved and the mental state was thereby improved. Again the nose became the offending organ and small deviations of the septum were treated with astonishing improvement of the psychic state. Then the period of the reflex passed and another took its place.

In it the patient was suffering either from the affects of some bacterial poisoning or of some toxins which he elaborated in his own system. It was never a simple substance, but always some obscure poison which could not be named.

All these organic theories and practises held sway for a time and during it they worked many cures. The men who practiced them were zealous and enthusiastic. But after a time the number of cures began to fall off and the methods gave place to new ones. This brings us to the conclusion that the cures depended on the presence or absence of belief When belief and enthusiasm are high, the cures are many, but when the belief begins to fall, the cures are few. It would then appear that the only proper treatment for the neuroses is the psychic treatment. But there are a great many differences of opinion as to the proper psychothera-

peutic measures that should be employed.

We have already spoken of the method of indirect suggestion in the form of drug therapy or other means which may cause an amelioration of the symptoms. But we must bear in mind that removal of the symptoms does not complete any therapeutic treatment in the neuropath. It is necessary to change his ideas and to explain the reason for his illness and to develop faith in himself and his recovery.

Psychotherapeutic measures are, in general, divided into two classes, suggestion, and persuasion. With the former, new ideas destroy existing ideas without the consent or judgment of the patient. The latter introduces new ideas with the full knowledge and consent of the patient.

Direct suggestion is then only directed to the psychic automation and will be effective only in so far as the patient restrains the phenomena of consciousness from entering the attention during the treatment. For this reason it is only logical that the partisans of this method require that it be given during hypnotic sleep. During this state, what is called forth, as well as what is acquired, is done independently of any conscious will on the part of the patient. In other words the action of the physician is all-powerful. Hypnotism raises serious questions of a moral and social nature which we will not be able to discuss here. However, we may say, that one cannot with impunity accustom a subject to accept suggestion from others. It is a direct attack against the personality, and although the latter may be modified by the practice it is rather in a deteriorating manner than in a developing one. What the physician has done in practising hypnotism is to develop the psychological automatism and lower the intellectual control; and the physician is responsible to a larger degree for the faculty of auto-suggestion which his patient has acquired. It is true that many symptoms of Hysteria react quickly to this method of treatment. But the same result may be obtained by other methods with a minimum of risk to the patient.

Suggestion during the waking state is a different thing entirely from hypnotic suggestion. In the former method the patient is placed in a condition of receptivity by being put in a dark room without physical discomfort and told to place himself in such a mental state that no thought or sensation may come between the patient's mental attitude and the suggestion the physican is going to make. The suggestion will be put in the form of repeated affirmations, for any discussion would waken the mentality of the patient. By this means a great number of good results in the treatment of neuropathic conditions has been obtained.

In direct suggestion one does not take into consideration the higher mental stratum or the critical power of the patient. It tends to weaken rather than strengthen these faculties and it does not in any way accustom him to judge his own impressions or recognise the value of his sensations. Here again the attempt to improve the symptoms or cure the condition by outside suggestion only tends to re-inforce the patient's auto and hetero-suggestibility, which form the very basis of his trouble.

Psycho-therapy by persuasion consists in explaining to the patient the true reasons for his condition and the different functional manifestations which he presents. It consists in establishing the patient's confidence in himself and awakening the different elements of his personality of becoming the starting point of the effort which will enable him to regain self control. It is accomplished by a series of conversations and heart-to-heart talks with the patient. The part the physician plays is to recall, awaken and direct. He has nothing to do with suggestion. He does not demand that the patient accept what he has told him as gospel truth; he only asks that the patient try to reflect and understand. And if, as is the rule, the patient is cured, it should seem to him that he has evaded

his neuropathic condition through his own efforts. Hence the self confidence of the patient would be greatly increased and the fear of relapses removed.

The Freudian method of psychotherapy is one of analysis rather than suggestion. The aim of this method is to explore the whole of the subconscious if possible, so that all and every source of emotional distress may be brought to light, and be dealt with by the patient. Not every neuropath is suitable to treatment by this method, which is, on the whole, a serious operation. All patients proceeding to dementia, all feeble-minded patients, or those in maniacal states should not be accepted as patients, nor should those whose symptoms may be relieved by simpler means.

In this method, as briefly outlined, the history is taken as usual and a careful and thorough physical examination should be done. Then the nature of the unconscious is explained to the patient and the object of getting him to learn the content of his unconscious mind, and this is best performed by obtaining the dreams of the patient. He is to write down his dreams immediately on awaking, to prevent distortion or loss of some part of it. When the patient has read over his dream it is to be taken clause by clause, and then, adopting the method of free association the patient is to say whatever comes into his mind, no matter what it may be.

Let us discuss briefly several adjuvants to the psychotherapy of neuropathic conditions. In some cases it would be impossible to cure the patient if isolation were not enforced. It is not an end in itself, as in Weir Mitchell's treatment, but only a means which is necessary in a certain number of cases. According to the severity of the case isolation may be absolute, or may be isolation from one's family circle and environment, or it may be merely isolation from one's family circle alone, or one's environment alone. The degree of isolation, of course, depending upon the severity and character of the neuropathic condition. Rest in its broadest sense means physical rest, mental rest, and moral rest. The need of physical rest differs in the various conditions and the physician must be careful in his decisions. In a general way we may say that the faster the patient gains in weight the shorter should be the rest in bed. Mental rest consists in prohibiting all brain work for the patient. However the giving up of business, professional life, or even reading will not stop the patient from thinking. One can often bring about a state of mental repose in agitated patients by. mechanical work in the form of weaving or other form of occupational therapy. Moral rest consists in removing the patient from the responsible position which he may hold in the social or family life of the community. The patient must be made to feel a sense of security towards the present, so that he may be able to forget the past and strengthen himself for the future.

Overfeeding as an adjunct to psychotherapy lends itself to a more systematic application. In the majority of cases it is found that a milk diet, whether complete or partial, gives the best results. The amounts and methods differ with the various workers. A good plan is to give milk from hour to hour in increasing amounts twelve times a day. Start by giving three quarts the first day and gradually increase to five quarts in eight to ten days.

In this brief paper no attempt has been made to give any specific method for the examination and treatment of the neuropath. The various methods and schools of treatment have been brought forward and an attempt made to give them their proper value. The method of approach of the physician and his manner of treatment must be decided upon by himself. In this respect it is urged that due time be given to the examination of the patient. A thorough and complete examination increases the confidence of the patient in the physician and will be a great step forward in the treatment of the neuropathic condition.

*Treatment of Exophthalmic Goitre

(By T. H. Belt, 2T8.)

The surgeon says the diagnosis of hyperthyroidism is the indication for thryoidectomy. Internists and roentgenologists differ with this viewpoint in many instances and often prefer to give non-operative procedures a trial at least, before advising surgical treatment.

From the medical point of view a great deal has been claimed for iodine therapy as the essential item in a broad non-operative regime. Much discussion and dissension centres around its use. Perhaps on account of its known value in the prophylaxis of simple goitre more has been hoped for from the use of iodine in the treatment of hyperthyroidism than clinical observations warrant. McCrae voices an illuminating edict upon this subject, which, if it is to be relied upon, clarifies the situation considerably and obviates much of the confusion regarding the employment of iodine in the treatment of exophthalmic goitre. He states that the response of the patient to iodine depends upon the degree of dysfunction complicating the hypersecretrion of the gland. That is, the less the toxicity of the secretion the greater the efficacy of iodine. Thus, it would appear that it only has a beneficial effect in the treatment of a minority of patients. It is known to have produced temporary remissions in many cases and on that account many surgeons adopt it as part of a pre-operative treatment, though Crile is a notable exception. He states that unfavorable effects are produced in the majority of cases, indeed, that in a goodly percentage of cases, iodine is responsible for the precipitation of a dangerous crisis. It may cause the hyperplastic goitre to become so greatly increased in size as to provoke dangerous pressure symptoms with need for an emergency throidectomy to save the patient's life. Its use, therefore, should be very guarded and discontinued upon the slightest evidence of untoward effects.

X-ray: There is much dispute between surgeons and roentgenologists as to the relative value of their respective curative measures in the treatment of exophthalmic goitre. Indeed the argument is much too extensive to review in a paper such as this. Crile states the surgeon's viewpoint concisely as follows:

"X-ray does reduce the activity of the thyroid gland. It is a simple and painless procedure and one might ask then, Why it is not used to the exclusion of other treatments? Because of the following disadvantages.

1. The dose required to produce a given effect is at best a guess.
2. Cosmetic results are sometimes very bad X-ray burns.
3. Relapses are common.
4. The delay in unsuccessful cases leads to serious damage to the heart and nervous system.
5. In case of operation later, the scar tissue and adhesions caused by previous X-ray are a handicap.

The dilemma of X-ray is: Myxedema or relapse? If the dose is sufficient to kill all the thyroid cells, myxedema results. If the dose does not kill the cells they regenerate and there is relapse."

One is compelled to favor the surgeon's viewpoint since the rest cure, iodine therapy and X-ray too often fail and the patient has sustained serious additional damage to heart and nervous system, perhaps permanent damage, occasioned by the delay. His life has been shortened and the hazards of operation increased. Current statistics as to operative cures are difficult to evaluate impartially since surgeons are

*Abridged from a paper read at Surgical Discussion Group, H. S. C., Jan. 17, 1927.

sometimes prone to pronounce the operation successful if the wound heals by first intention and the patient is able to leave hospital within a reasonable time. Crile states, however, that the mortality of thyroidectomy is now as low as that of appendectomy.

Each case is a law unto itself and some cases may permit of total thyroidectomy at one operation, others require a graded procedure, sometimes to the extent of four steps. If possible the surgeon should wait till one of the so-called remissions occurs before attempting operative measures, for, as will be readily understood, the patient in a crisis is a poorer operative risk.

Pre-Operative Treatment: This is one of the most important steps in the care of hyperthyroid patients. It is of interest to note the elaborate precautions taken at the Crile Clinic in Cleveland, Ohio, to preserve tranquility in the pre-operative patient. Although Crile's methods are beyond the reach of most hospitals, one cannot do better than emulate his methods as far as possible. On admission to hospital the patient is put to bed in the regulation operating room garments and absolute rest enforced. Visitors are restricted, business and other exciting matters kept from him and no reference is made to the proposed operation. They endeavour to keep him in as optimistic a frame as possible. The day of the operation is made known to the patient's family only and not to the patient himself.

In order to maintain bodily weight while resting in bed, Bram states that exophthalmic patients require food intake 75 per cent. to 100 per cent. greater than that required to maintain basal metabolism. Fresh foods had better be reduced to a minimum on account of the specific dynamic action of protein which tends to accelerate metabolism. An occasional small portion of fowl or fish may be permitted to overcome the possible monotony of an otherwise protein-free diet. Tea, coffee and other stimulant, spices and condiments are strictly forbidden. Three very ample meals daily consisting essentially of bread, cereals, fruit and vegetables, supplemented with three extra nourishments between meals should constitute the diet.

The daily fluid intake must be as high as 3,000 cc., in some cases with persistent nausea and vomiting up to 7,000 cc. per day are administered. If it cannot all be taken by mouth, hypodermoclysis is employed. In extreme cases transfusion may be necessary. Breakfast is served at 9.30 every morning so that the operation may be performed without arousing the patient's suspicion by omission of the morning meal.

Digitalis is administered preoperatively if necessary to improve cardiac and renal function. Bromides or codiene are given every night to insure against insomnia. In order to protect the patient against a possible temporary thyroid deficiency subsequent to operation, thyroid extract gr. 2 is given the night before operation and repeated in the morning. The effect of this medication is not apparent for twenty-four hours, the time at which it would be needed. One hour before the time of operation, morphine gr. 1-6 and atropine gr. 1-150 are administered by mouth. For some time at this clinic injections of sterile water were given to pre-operative patients each morning so that the hypodermic of morphine and atropine would not appear unusual. Similarly, inhalations of oxygen were given by a nurse each morning so as to camouflage the introduction of the gas and oxygen anaesthetic on the day of operation. As a further deception, the anaesthetist employed is a female physician garbed as a nurse. The operation itself is frequently done in the patient's own room. The anaesthetic in each case is tentative only, for if the patient's response is unfavorable, the preparations for operation are suspended.

Ligation of Thyroid Artery: In the Crile clinic it is employed only as a preliminary to thyroidectomy. It is claimed by other authorities that

double ligation in itself may be a sufficient operative procedure to produce a clinical cure, but there is a tendency to relapse and when this occurs the graded operation is then impossible.

The superior thyroid artery is ligated in preference to the inferior for the reason that the latter lies deeper and its ligation is apparently less effective, probably because the nerve supply to the thyroid runs along the superior artery. The operation is best performed under analgesia and local anaesthesia. The vessel is approached through a small transverse incision paralleling the folds of the neck over the superior pole of the gland. The incision should be symmetrical if both sides are to be done. The fascia is then divided, exposing the preglandular muscles, the fibres of which are separated, not severed, and held apart. This retraction gives an almost uniform exposure of the artery which is then tied with silk. A second ligature is passed around the superior pole to make sure that the main artery, and not only a branch, is included. The thyroid tissue involved in the second ligature is infiltrated with 1 : 600 quinine and urea hydrochloride. No deep sutures are used. The skin incision is closed with clips, four usually sufficing, and these are removed on the third day for, if left longer, they may cause slight punctate scars.

Usually the artery of but one side is tied at one seance, for, if it is a grave risk, the double ligature would increase the risk too much and even in apparently safe cases, the single ligation may disclose a hazardous situation. Moreover, if there is doubt as to whether the patient might safely endure a thyroidectomy, a single ligation will give the cue, and if the indication is favorable, the thyroidectomy may follow with safety in three days.

Post-operative Treatment: This problem is essentially one of individualization again. It is especially important to have a thorough understanding of the case before operation in order to anticipate and direct treatment against possible developments.

The perspiration-soaked garments are substituted for dry and warm clothing immediately the operation is completed. To compensate for the loss of body fluids by hemorrhage and hyperidrosis, bilateral hypodermoclysis is instituted at once, 1,000 cc. of normal saline being administered, the site of injection locally anaesthetised with novocaine. In addition, water by mouth is urged as soon as possible with an attempt to make the total daily intake 4,000 cc. or more. This extra fluid reduces acidosis and the concomitant nausea to a minimum.

The comfort of the patient is very important. Usually the position of greatest ease is the semi-sitting, with pillows banked under each arm. To alleviate pain and secure absolute quiet, morphine is given in 1/6 doses immediately after operation and repeated whenever necessary. In all cases an ice-cap is kept constantly over the precordium. In severe cases 4 to 6 ice caps may be distributed over the trunk and extremities. An ice compress applied to the patient's forehead adds to his comfort materially.

Transfusions of 400 to 650 cc. of whole blood during the first 12 hours after operation in severe cases has a very beneficial effect. A soft diet is given for the first 36 hours. Enemata on the morning of the second post operative day is given if the condition of the patient permits. The flexible or gauze drain is removed at the end of 24 hours in the absence of surgical complications, and the skin clips at the end of three days. The average patient may be discharged from hospital in from 10 to 20 days.

Post-operative Complications: These may be divided conveniently into two groups, those affecting the wound and those affecting the constitution. The former respond readily to treatment, the latter often are dangerous and some are fatal even though they receive prompt and thorough attention.

Oozing and hemorrhage from the wound are common enough, infection rare. It is sometimes necessary to re-

open the incision to tie off bleeding points or to irrigate with antiseptic solution. Tracheitis is apt to occur in those patients in which the wound has been packed, and it is frequently accompanied by stridor, both inspiratory and expiratory. It is treated expectantly, but if enough obstruction persists to seriously embarrass respiration, an emergency tracheotomy may have to be performed. Injury to the recurrent laryngeal produces a stridor which is inspiratory only. It, too, must be treated expectantly.

The heart is seldom the source of post-operative trouble, especially if the operation has been well timed. If serious fibrillation with circulatory failure should develop, the same treatment as described under pre-operative procedure is instituted. The pulse rate may be very slow following operation and may give rise to alarm, but this is reported as a common sequela, due to vagus stimulation, and clears up in a few hours without special treatment. Various types of psychoses may develop soon after the operation. In common with all other major surgical procedures, thyroidectomy may be followed by pneumonia, which is one of the most important causes of mortality in goitre surgery. Tetany, the parathyroid deficiency syndrome, and myxedma are other possibilities.

Post operative thyroid storms, formerly the bête noire of goitre surgeons, are very infrequent under modern treatment. They can be anticipated by one with clinical experience enough, and forestalled by the pre and post-operative treatment described above.

Prognosis: The prognosis depends upon such circumstances as the age, sex, previous condition of the patient, the severity and duration of the syndrome, the presence or absence of complications and the mode of treatment that is adopted. It is therefore impossible to give any definite general rule of prognosis, beyond stating that thyroidectomy produces very satisfactory results as a whole if performed competently and before the disease has made irreparable inroads into the system.

A Few Notes on the Acute Exanthemata

(Geo. E. Reed, M.B., Tor.)

This paper consists of a few isolated observations on the diagnosis and treatment of some of the acute exanthemata, which might prove useful. Obviously there is no attempt made at completeness in any one branch of the subject.

One whose experience with the acute exanthemata has been limited to certain childhood memories is in store for certain surprises and definite impressions when suddenly intrusted with the care of one of these cases. The physician will early learn the value of a short history which must be to the point. Thus the presence or absence of history of having had an exanthemata under suspicion is very important. When the diagnosis of smallpox is being considered it is typical of the experienced clinican to first look for a vaccination scar. A history of illness among other members of the family is suggestive. Thus a child may be suffering from scarlet fever and the only contact a sore throat in another member of the family. A history of having been away visiting or entertaining out of town visitors is significant, particularly in the case of typhoid and smallpox. The general appearance of the patient is of value in many cases, the bright eyes, flushed face, circum oral pallor in a scarlet fever patient is in many cases typical and forms a contrast to the quiet undemonstrative patient moderately ill with diphtheria. Seriously ill diphtheria patients with marked pallor, glossy conjunctivea and swollen

neck and a peculiar odor pervading the room form a very characteristic picture. The watery puffy eyes and the bluish rash on the face of a measle patient is not to be overlooked, but not always to be expected.

Examination of the patient may modify the suggestions of the history and the general appearance. The majority of the acute exanthemata have important clinical signs in the nose and throat. These cannot be appreciated unless the examining physician has an excellent light and gets at least one good look at the buccal, palatal, faucial, and pharyngeal mucous membranes if this is anatomically possible. One should be very particular in the examination of the palate in scarlet fever for the appearance of the tongue is usually deceptive while the palate very often shows a typical rash and even a few petechiae. The general rule is that a child suffering from scarlet fever resists throat examination rather more than a diphtheria patient. A common fallacy regarding diphtheria is the idea that the diphtheria membrane is single, often there is a spot on each tonsil or perhaps a spot on the tonsil and on the uvula. Nasal diphtheria is often mistaken when primary and any child who is sick and who has a serous or serosanguinous discharge from one or both nostrils should be carefully examined for nasal diphtheria; often the membrane cannot be seen. Examination of the nose and throat should always include the cervical glands. The anterior group are always enlarged in scarlet fever and diphtheria unless the tonsils have been removed. These glands are usually tender in scarlet fever, seldom in diphtheria. They form an important feature in the diagnosis of Vincent's angina. The pseudomembraneous type may simulate scarlet fever or more often diphtheria. The inflammation of the throat is more fiery red than one would expect in a diphtheria throat, in this way simulating scarlet fever. The cervical adenitis is usually less in proportion to the condition of the throat than in either diphtheria or scarlet fever. In this regard one may note that early in Vincent's the smear may show fusiform bacilli with no spirilli. Spirilli will appear within two, three, or four days. the posterior cervical glands are often enlarged (50 per cent.) in German measles, but when these glands are large the head should be examined for pediculi.

Examination of the chest introduces some new factors. There are always harsh breath sounds or some rales in the chest of a case of measles with the rash well out. The high temperature often seen with scarlet fever is usually accompanied by a soft systolic murmur heard best at the apex. The lower temperature and the insidious onset of diphtheria does not give *early* signs of myocardial embarrassment. Even severe cases show little on the examination of the heart *however severe the changes may be when they do appear.* The bronchitis often present during the onset of typhoid has often led to that harbour of the "diagnostically destitute" namely the diagnosis of "Influenza."

The diagnosis made, the treatment of these cases have little points of interest outside the general principles of serum therapy. The keystone of the treatment of a diphtheria patient is absolute rest following the administration of antitoxin. Thus the patient should never be wakened from sleep to be given throat irrigations or medications. This principle of rest must be emphasized and is necessary to lessen the strain on the cardiovascular system. Many cardiologists have stated that in certain cases "Morphine" is the best cardiac stimulant. The failing heart of diphtheria characterised by an increased and sometimes irregular pulse, precordial pain, extreme restlessness, and low blood-pressure responds to morphia in small repeated doses in that the restlessness and the pain are relieved. The exhibition of strychnine, caffeine, and similar drugs should only be to tide the patient over for a matter of hours. The scarlet fever patient on the other hand is acutely ill, febrile with a painful, irritable, infected

throat and consequently very uncomfortable, hence the use of the ice collar, throat irrigations, and an excess of fluids and tepid sponging controls the temperature to some extent and makes the patient much more comfortable. One very important point to be remembered about scarlet fever patients is the very extreme susceptibility to draft. Thus a slight current of cold air may precipitate a cervical adenitis, an otitis media, or an acute rhinitis, which will each prove very resistive to treatment. Another point in the care of scarlet fever patients is that when desquamating the skin should be allowed to come away of itself with perhaps the aid of some oil preparation; this applies particularly to the hands where paronychia often develops if the desquamating epithelium is removed prematurely. The convalescent scarlet fever patient is very prone to develop slight or alarming rises in temperature. Complete examination may lead one to expect appendicitis, this will usually be forgotten once an enema is given.

The child suffering from measles often presents problems peculiar to itself. The acute otitis media accompanying measles is often catarrhal in nature during the height of the rash. The acute otitis media of scarlet fever on the other hand develops much more rapidly and is usually purulent. The middle ear infection in measles, which develops after the rash has begun to fade, is, however, usually purulent. This being the case paracentesis of the tympanic membrane is indicated. The operation if done without an anaesthetic is often painful while in the case of measles, especially in a young child, even a short ethyl chloride anesthesia entails a definite risk of pneumonia.

The typhoid epidemic in Montreal has emphasized many points in the diagnosis, prognosis, and care of these patients. An exereme protean type of onset and course was noted. The great variation in complications was surprising; including such rare events as acute congestion of the kidneys and acute epididymitis. It was found that many patients were admitted to the Hospital suffering from acute distention, necessitating relief by repeated enemata. The use of ordinary chewing gum to keep the mouth clean proved very efficatious.

The use of various serums usually containing protein have become very common. The fear that the general practitioner has of the various anaphalatic phenomenon is exaggerated. *However, it may be well to mention a few facts regarding this condition.* The commonest reaction is a so called serum sickness which usually consists in the appearance of a rash, often urticarial in nature, about a week or ten days from the administration of the foreign protein. This rash may consist of a few spots or may cover the whole skin surface and cause swelling of the fingers and lips, depending upon the seriousness of the rash. There may be some little temperature as well as a trace of albumen in the urine. If this rash is severe it is very uncomfortable and if adrenalin or pituitrin in full doses fails to relieve the condition morphine is usually indicated. In susceptible individuals this rash may appear within the first two or three days. In this event it is usually very severe accompanied by severe headache, shortness of breath, rapid pulse, pallor, and perhaps unconsciousness with or without high temperature. In this case moderate doses of intravenous adrenalin, moderate doses of atropine hypodermically or large doses of morphine have each been effectual in relieving the condition. The more immediate reaction to a larger intravenous dose of foreign protein is usually a hyperpyrexia, this will sometimes yield to a full dose of adrenalin intravenously. The history of the patient in some rare cases may suggest susceptibility to foreign protein. In this case an interdermal dose of 1/10 of a cc. of 1/100 solution of the foreign protein will give a marked reaction within a half hour if the patient is susceptible.

The convalescence of the acute exanthemata have a few features worth emphasizing. The illness usually results

in an appreciable secondary anemia.This is particularly so in scarlet fever. Iron, calcium, and phosphorus combinations with some strychinine may or may not aid in metabolism, but they do increase the patient's interest in getting well and they improve the appetite. Gradual change from a bed to a chair, to a walking patient is always good practice. This is to be followed to a detailed extreme with diphtheria patients. The condition of the nose and throat frequently calls for active treatment. Tonsillectomy is in many cases clearly indicated to improve the condition of the nose or throat, or to remove the focus of infection that prolongs the isolation period. This applies of course particularly to scarlet fever and diphtheria. The importance of fresh air and sunshine in restoring the patient's health is difficult to over emphasize.

Physiological Experiments on Athletes.

The Electrical Timing of Runners.

(C. H. Best.)

Department of Physiological Hygiene, School of Hygiene, University of Toronto.

This communication was given by Dr. Best, on the evening of December 17th, as a public lecture, under the auspices of the Royal Canadian Institute. It was accompanied by demonstrations on the stationary bicycle, and of the electrical timing apparatus.

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It occasionally happens in the course of scientific research that the knowledge gleaned or the methods developed can be applied to industry or to sport. The intensive investigation to which the physiology of muscular exercise has been subjected has yielded results capable of practical application not only in both these spheres, but also to the prevention and treatment of disease. We are chiefly concerned this evening with the results of certain experiments on the electrical timing of runners. Many of these findings, however, can only be interpreted in terms of the known facts of the physiology of muscular movement.

When a muscle contracts it grows shorter unless its ends are fastened to structures which do not move, in which case the muscle exerts a force on these structures. It is very interesting to study the physical and chemical changes which take place in the muscle during a contraction. The results of this study throw a great deal of light on the phenomena which occur during muscular exercise in man. When a muscle is analyzed to determine the food material utilized no use of fat or protein can be demonstrated. Sugar, however, disappears. Sugar exists in the muscles as glycogen, a complex sugar, and as free sugar. As the sugar is used up there is a formation of lactic acid. If there is an adequate supply of oxygen the lactic acid is oxidized to CO_2 and H_2O or reformed into glycogen, as fast as it is formed. In the deficiency of O_2 the lactic acid accumulates until such a concentration is reached that the muscle is unable to contract. This limiting concentration of lactic acid will vary for different muscles, but is of the order of one part in 300 for frog's muscle. If a muscle is plentifully supplied with oxygen a great deal of work can be done before fatigue is observed. And after fatigue there is a rapid recovery. If the muscle is kept in nitrogen there is a much more rapid onset of fatigue and no recovery after fatigue. When the muscle is requiring oxygen faster than it is forthcoming

the muscle goes in debt for oxygen. The lactic acid accumulates because there is not sufficient oxygen and the amount of lactic acid is a direct measure of the magnitude of the oxygen debt. One litre of oxygen is equivelent to six grams of lactic acid. During the recovery phase this debt for oxygen is made good. The muscle has been compared to a battery. Both are so constituted that they can discharge very rapidly a great deal of energy—in violent muscular contraction or in starting a car—and this expenditure can be made good slowly during rest after exertion or during the time the car's engine is running.

We can determine the particular food material which is used in the whole body during muscular exertion by analysis of the air which is breathed in and out of the lungs. There is good evidence that sugar is the principal material burned. If we examine, by chemical means, the blood of individuals during or directly after muscular effort, the lactic acid content is greatly increased. This is true even if only a limited number of our muscles have been active. The lactic acid which is formed in the active muscles diffuses away into the blood and is cared for by all the muscles of the body. When our lungs are able to supply adequate oxygen there is no accumulation of lactic acid. If there is a deficiency of oxygen the lactic acid accumulates rapidly. When an athlete is completely exhausted the concentration of lactic acid in his tissues has been calculated to be about one part in 300—the same as was found in the completely fatigued frog's muscle. We can determine roughly the amount of lactic acid by finding how much extra O_2 a man takes in from the completion of the exercise until he is back at his resting rate of oxygen consumption. It is unnecessary to discuss the effects of exercising the human individual in an atmosphere composed entirely of nitrogen. A large amount of work could be done in a short time, but there would be no recovery.

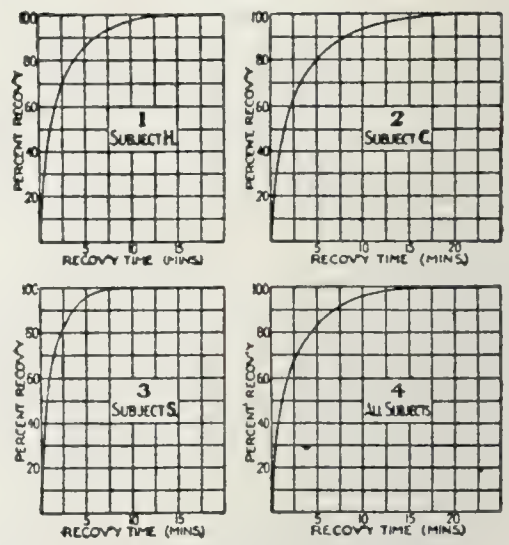


FIG. 39.—Curves of recovery for three different individuals and a mean curve, from fairly severe exercise of short duration. Vertically is shown the degree of recovery as per cent. of complete recovery; horizontally is shown time from the end of the exercise. (Sargent.)

The intact organism can go in debt for oxygen as well as the isolated muscle. As a matter of fact we go in debt for O_2 during any strenuous exertion. The exact amount of the debt and how long it takes to pay it off can be accurately measured. It may require 12 to 20 minutes to recover from a 100-yard race, an hour to recover from the quarter mile. There will be a variation from one individual to another, but the average time necessary for recovery from any race could easily be determined, and the results might be of interest to those who arrange the spacing of the heats, and to the athletes. There is a certain amount of data on this subject already available.

The efficiency of muscular movement can be measured by determining the amount of oxygen required to do a definite piece of work. The efficiency depends on a number of factors. There is in many instances a definite optimum rate of contraction. If the rate is more rapid or slow than this optimum there is a waste of energy. Where a muscle is fatigued there is a waste of energy, i.e., it is less efficient.

The efficiency of the whole body can be measured. We are about 25% effi-

TABLE

Distance.	300 yds.	¼ mile.	⅓ mile.	½ mile.	1 mile.	2 miles.
Calculated best time.	33.3 s.	51.5 s.	1 m. 12⅕ s.	2 m. 1 s.	4 m. 41 s.	10 m. 12 s.
A's actual best time.	34 s.	51.4 s.	1 m. 15 s.	2 m. 2 s.	4 m. 40 s.	10 m. 10 s.

cient, that is 25% of the energy we use can be recognized as mechanical work. It is very interesting and instructive to determine the most efficient rate at which a piece of exercise or work can be done. The most efficient speed has been worked out for a variety of exercises or tasks. Stair-climbing has been investigated, or wheeling bricks. The most efficient speed of swimming can be obtained.

In the illustration the subject is a famous swimmer and incidentally a medical man. The observer is a physiologist with whom several members of our medical faculty are well acquainted. One of the commonest devices used in the study of muscular exercise is the stationary bicycle. On these machines there is an automatic counter for the revolutions of the wheel. We can apply any friction we desire. The amount of work is easily calculated.

To return again to the isolated muscle it was stated that there is a rapid utilization of sugar during muscular contraction. Now, sugar is supplied from the food we eat and from the liver, where sugar is manufactured from other materials. This sugar travels by way of the blood and tissue fluids to the active muscles. When the demand for sugar in the muscles is very intense the sugar in the blood may reach very low values. We know that low blood sugar is associated with certain definite symptoms. After prolonged severe exercise, as in Marathon races or long distance swims, the participants often exhibit symptoms similar to those observed under conditions when the blood sugar is low—as after an overdose of insulin. Blood sugar determinations on Marathon runners at the end of the race have revealed very low values. There would be no point in giving sugar to sprinters, but in the long distance races fairly frequent doses of sugar might prove very helpful.

We have discussed the question of oxygen during exercise. There would be little use supplying oxygen in the short races where the effort is so violent that the lactic acid accumulates rapidly and reaches a concentration in which the muscle fibres cannot work. In the long races, however, the O_2 income could be greatly increased if more O_2 were available. Hiss has remarked that if a running track were constructed with a gas-tight covering so that the O_2 content of the atmosphere could be increased, world records for the distance runs could undoubtedly be broken. A runner would be able to better his previous records without additional fatigue.

When an isolated muscle becomes fatigued the first sign is a slowing in the rate of contraction. When an athlete becomes tired the first thing noticed is also a slowing in the rate of muscle contraction, i.e., for example, the speed at which he can move his legs. A runner finishing a quarter mile race is very conscious of the fact that his chief difficulty is that he cannot make his legs move as fast as they should.

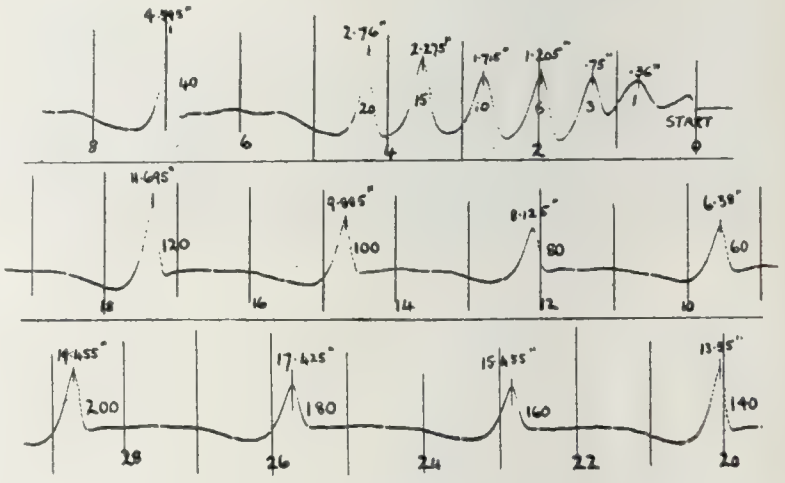
Methods have been developed by which the heat output of muscle during contraction can be studied. The muscle is laid on the junctions of a delicate thermocouple and the deflection of a sensitive galvanometer records the heat output during the various phases of contraction. It is found that only a part of the heat is produced during the actual contraction—a much larger proportion is produced during the recovery phase. The breakdown of gly-

cogen to lactic acid is non oxidative., i.e., no O_2 is needed. The heat liberated is partially produced by the neutralization of the acid by the protein and alkaline salts of the muscle. The heat is largely produced during the reformation of glycogen from lactic acid and the breakdown of a part of the lactic acid to CO_2 and H_2O.

From these results we would expect that a large part of the increased heat output due to short bouts of muscular exertion would take place after the exertion is over. It can be easily demonstrated that such is the case and this fact was established before exact data on the heat output of isolated muscle was available.

The fatigued muscle is more "viscous" than the non-fatigued. That is it resists stretching to a much greater degree. It is interesting also that a stimulated muscle is more "viscous" than the resting. If a muscle is connected to a steel spring and the spring set in vibration, the muscle will damp the vibrations of the spring to a certain extent. If the muscle is stimulated the damping is tremendously increased.

From the results of a study of isolated muscles and certain theoretical considerations Hill has constructed an equation of motion for a runner exerting maximal effort. To test this equation it was necessary to know the mass of the runners, his acceleration, and his maximum speed. From the moment the runner starts his velocity increases until it reaches a certain value, which is maintained until fatigue sets in. Now on a smooth, level track there is no appreciable external resistance to the runner. The air resistance is negligible. The factor which limits his velocity is the internal resistance of his muscles. To make possible the exact measurement of velocities an apparatus was constructed which gives these values with great accuracy. A series of coils, each made up of many turns of insulated wire, are placed at carefully measured intervals along the track. The coils are connected in series to a sensitive galvanometer. When a magnet is carried past a coil an electric current is induced which changes direction at the moment the meridian of the coil is reached. (It is necessary to correct for the slight lag of the galvanometer). The galvanometer is fitted with a small mirror on which is received a beam of light. The light is reflected from the mirror to a moving roll of photographic paper. The result of passing the magnet by the coil is to produce a waved line on the paper. The crest of the wave corresponds to the moment the center of the coil is passed. A time marker also records regular intervals on the paper. The intervals between the crests of the various waves can be accurately determined.



By the use of this accurate method of timing Hill and his collaborators have found the values calculated from the equation and the values actually observed correspond remarkably well. This resistance is the "viscosity" of the muscles. This "viscosity" is a useful thing because if we could move much faster we would run the danger of breaking. We are not built for faster speed. A very fast sprinter is much nearer his limit of safety than an ordinary athlete. The sprinter is much more likely to tear a tendon, or muscle, or even pull off a bit of bone, than a slower runner.

Now a man may be a good sprinter because he can exert a lot of force, or because his muscles are not as "vis-

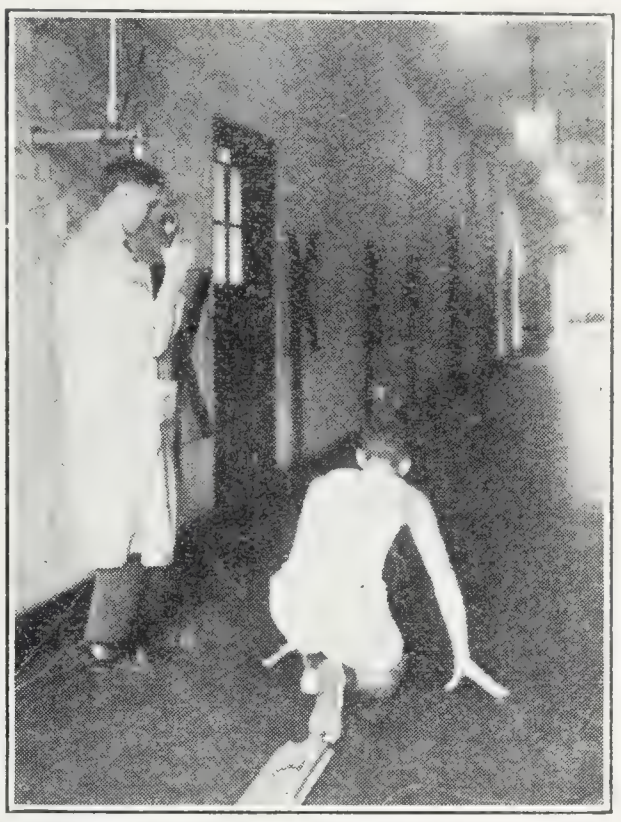
cous'' as the average person. Mrs. Partridge and I have had the opportunity of repeating and confirming these observations of Hill's many times during the recent track season. We are accumulating data on the changes which take place during training—is it an increase of force or a decrease in viscosity or both? We should be able to gain considerable information on these points. As Hill has pointed out the equation of motion of a runner can be applied to the problem of running up hill. In this case an external resistance is added. It is not easy to secure a series of graded running tracks. As has been suggested by Hill, and also by one of our colleagues, the addition of a constant force would serve the same purpose. We have been investigating the results of adding a constant resistance to the runner. A string is attached to the runner and as he progresses along the track he is opposed by the resistance necessary to turn a drum around which the string is wound. The resistance offered by the drum can be adjusted to any desired amount by tightening a tape which is attached to two spring balances. As the drum revolves without appreciable friction the resistance is the friction exerted by the tape. During the experimental period the runner first runs 60 to 70 yards at maximal speed. We know that he can repeat his performances 4 or 5 times

Maximum Speed with a Force

Exp. No.	Runner	Maximum Speed (No Force)	Ra / M	Maximum Speed with Force (calculated)	Maximum Speed with Force (observed)
1.	C.H.B.	9	17	8.83	8.83
2.	C.H.B.	8.90	20	8.68	8.68
3	C.H.B.	8.74	18	8.56	8.56
4.	C.H.B.	8.74	15	8.59	8.59
5.	W.S.	7.59	.27	7.36	7.36

with great regularity. It is interesting to see how the observed maximal velocity and the calculated agree.

We have not as yet obtained sufficient records to complete this series of experiments. The efforts of the experimental subjects, my laboratory of experiments. The efforts of the experimental subjects, my laboratory assistant and myself, to secure and maintain a maximal speed, particularly with the string attached, have aroused consid-



erable amusement. We are attempting to obtain further data on an improvised indoor track.

In the course of the research of Hill, Parkinson, and Furusawa, at Cornell, numerous applications of the results to athletics become obvious. It would be of great value, as they state, to a runner in the 220 yard race to have his optimum speed determined. He might also be coached in the determination and maintenance of this optimum speed if he were timed every few yards, as it is very easy to do. An automatic pacer would undoubtedly enable runners to break previous records. Other applications have been mentioned previously. In the observations which Mr. Thomson and more recently Mrs. Partridge, and I have made on the electrical timing of runners, we have obtained some good results which are of interest to athletes and coaches. When the starting pistol is appropriately wired the fall of the hammer is

recorded instantly on the photographic paper. We can correct for the slight lag of the galvanometer. There should be no lag in the pistol. When we arrange a sensitive switch so that it is broken at the first movement of the runner the time of this movement is recorded. The difference between these two is the lag of the runner. It is in the vicinity of 1/5 of a second. Of greater interest is the time from the pistol to the moment the runner passes the 1st or 2nd coil, i.e., the speed of "get away" of the runner. A series of these times are shown in table.

Exp. No.	Subject	Time of Getaway (in seconds)
1.	McH.	1.111
2.	W.S.	1.065
3.	W.S.	1.061
4.	W.S.	1.056
5.	W.S.	1.027
6.	C.H.B.	1.098
7.	C.H.B.	1.070
8.	C.H.B.	1.067
9.	C.H.B.	1.052
10.	E.C.M.	.997
11.	E.C.M.	.992
12.	J.H.R.	.992
13.	J.H.R.	.966
14.	J.H.R.	.955

This technique affords a reliable means for the evaluation of the various poses a runner may assume at the mark. The next measurement which is of interest to athletes is the distance run before a mixiumum speed is obtained. A broad jumper should take off when he has obtained this maximum speed, and of course before fatigue comes on. A slide shows the distance required to develop a mixiumum speed for a runner or runners—some taken from Hill's figures and some from our own records.

Maximum Speed

Subject	Maximum Speed (Yards per Second)	Distance (in yards)
W.S.	7.32	30
W.S.	7.8	28
W.S.	7.9	28
McH.	7.58	30
McH.	7.96	32
C.H.B.	8.88	40
C.H.B.	8.9	35
C.H.B.	9.0	45
J.H.R.	10.6	50
E.C.M.	10.7	55
H.A.R.	11.46	70

Fatigue begins to come on at about 40 to 70 yards—the exact point varies with the type of runner investigated and the condition of the runners. For a given runner the point at which fatigue, i.e., a decrease in speed, appears would be one valuable indication of the success of the training. In our observations fatigue appears at from 40 to 50 yards. Another series of observations which has aroused considerable interest is the test to which we have subjected a group of timers. A "dummy" watch was constructed. When the stem was pressed an electrical contact was made and this was recorded on the camera. The difference between the record of the pistol and of the watch gave us the timer's lag. The values are given in table.

The timers improved with practice. One became very expert. On one occa-

	Dr. C.	Dr. S.	Mr. H.	Mr. M.	Mr. L.	Dr. B.	Dr. C. B.
	.133	.142	.213	.218	.221	.234	.285
	.098	.204	.236	.215	.318	.215	.262
	.157	.167	.160	.168	.245		.165
	.138	.142	.161	.159	.198		.291
	.128	.139	.153	.205	.233		
	.138	.153	.209	.162	.226		
	.121		.147	.140	.233		
	.128		.154	.195	.159		
			.192		.159		
			.186		.221		
			.179		186		
			.159		.159		
			.204		.162		
Average	.131	.158	.181	.182	.209	.224	.251

sion the record of the watch was recorded before that of the pistol. Now the lag of the timer makes the runner appear to run faster. It might be thought that the timer would lag again the same amount at the finish as at the start and that the two would cancel each other. This is not the case. The timer can gauge the time the runner will hit the tape and his second press of the watch often coincides exactly with the moment the runner passes the coil placed at the 100 yard mark. In some cases the timer is too eager and presses his watch before the proper moment. The comparison of the electrical time for a series of races with that given by the official timer's shows us the discrepancies between the two.

It is obvious that more exact methods of timing should be adopted in important races.

In the observations we have referred to it has been necessary for the runners to carry a light steel rod. This more, only two runners could be timed with the single string galvanometer

TIME RECORDS

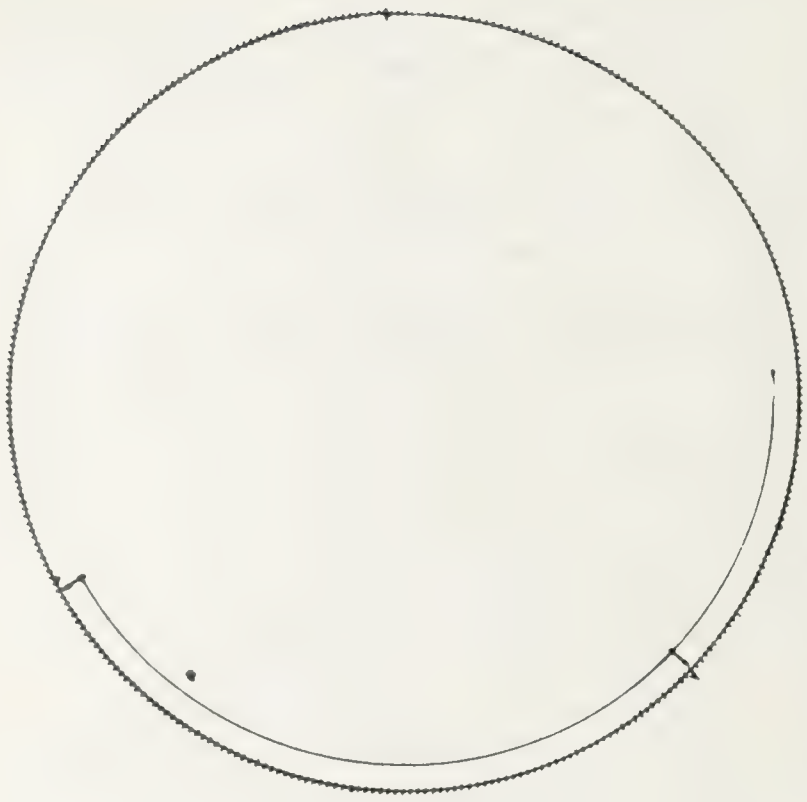
U. C. TRACK MEET	TIMER'S TIME	ACTUAL TIME
100 yd. dash	10.0	
	10.0	
	9.9	10.27
	10.2	
	10.0	
440 yd. dash	51.8	
	51.8	53.43
	51.8	
100 yd. exhibition	10.4	
	10.4	10.64
	10.5	
100 yd. exhibition	10.35	
	10.2	10.51
MEDICAL TRACK MEET	TIMER'S TIME	ACTUAL TIME
440 yd.	57.4	
	57.28	57.64
120 yd. hurdles	22.2	
	22.25	22.49
100 yd. dash	10.8	
	11.0	11.25
INTERFACULTY TRACK MEET	TIMER'S TIME	ACTUAL TIME
100 yd. dash	9.8	
	9.8	
	9.8	
	10.0	10.066
	10.0	

has been tied across the chest. Runners are a sensitive, perhaps superstitious group. It was difficult to persuade them that a small magnet would not hinder their progress. Further- available. In order to obtain the exact time from pistol to tape a light switch was attached to the tape. The pistol made the circuit and this was broken

Lag of Finishing Tape	
Exp. No.	Lag in seconds.
1	.037
2	.031
3	.053
4	.055
5	.049
Average	.045

when the foremost runner hit the tape. The lag of the tape is very small and could be reduced if necessary.

In order to obtain records from the apparatus described above it is necessary to remove the film from the camera, develop it, and measure the intervals accurately. It is a relatively simple procedure to construct a more satisfactory apparatus which will give a permanent record of the time of the race. All that is required is a pistol such as we have used, two signal magnets, a revolving surface such as the record holder of a phonograph, and a clockwork device. To the signal magnets fine pens can be attached. The magnets can be so arranged that the pens write one exactly above the other on a paper placed on the revolving surface. One magnet records every 1/10 second, i.e., it receives a current of electricity every 1/10 second from the electrical clock. The other magnet records the pistol and the tape. The time between the pistol and the tape is obtained by counting the number of 1/10 seconds. This counting can be facilitated by having every second marked by a gap or a higher flick of the magnet. Such a record made from a rough



"set up" in our laboratory is shown in this illustration:

In collaboration with A. V. Hill, who is responsible for so much of the work I have been discussing, it is hoped to make further observations on athletes at the Olympic games in Amsterdam next summer. In the autumn it should be possible to follow, in greater detail than has been possible this year the course of training of some of our athletes here. The coaches and the athletes have been very willing to cooperate and if we can suggest procedures which are of practical value to them they will be even more anxious to facilitate our researches. These studies on healthy normal men which are being carried out in various laboratories have already furnished a great deal of information which is of value in determining standards of fitness and therefore in the early recognition of disease and its prevention. If we can gain more information about the process of training, the factors which produce fatigue, and about the recovery process on normal men the knowledge may be applied to the problem of raising the general standard of human fitness. These are applications also to the treatment of patients or convalescents. An interesting step in this direction has recently been taken by Meakins and Long. Many others of these physiological results await further investigation and application to medicine.

We are indebted to our colleague Mr. E. W. McHenry for his help and for useful suggestions, and Mr. Wm. Parkinson and Wilfrid Staples for their technical assistance. The University Athletic Association, through Mr. T. A. Reed, gave us the use of a room for our apparatus at the Stadium and facilitated our investigations in every possible way.

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*The Care of the Patient

(Francis W. Peabody, M.D.)

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It is probably fortunate that systems of education are constantly under fire of general criticism, for if education were left solely in the hands of teachers the chances are good that it would soon deteriorate. Medical education, however, is less likely to suffer from such stagnation, for whenever the lay public stops criticizing the type of modern doctor, the medical profession itself can be counted on to stir up the stagnant pool and cleanse it of its sedimentary deposit. The most common criticism made at present by older practitioners is that young graduates have been taught a great deal about the mechanism of disease, but very little about the practice of medicine—or, to put it more bluntly, they are too "scientific" and do not know how to take care of patients.

One is, of course, somewhat tempted to question how completely fitted for his life work the practitioner of the older generation was when he first entered on it, and how much the haze of time has led him to confuse what he learned in the school of medicine with what he acquired in the harder school of experience. But the indictment is a serious one and it is concurred in by numerous recent graduates, who find that in actual practice of medicine they

*One of a series of talks before the students of Harvard Medical School on "the Care of the Patient."

encounter many situations which they had not been led to anticipate and which they are not prepared to meet effectively. Where there is so much smoke, there is undoubtedly a good deal of fire, and the problem for teachers and for students is to consider what they can do to extinguish whatever is left of this smoldering distrust.

To begin with, the fact must be accepted that one cannot expect to become a skilful practitioner of medicine in the four or five years allotted to the medical curriculum. Medicine is not a trade to be learned but a profession to be entered. It is an ever widening field that requires continued study and prolonged experience in close contact with the sick. All that the medical school can hope to do is to supply the foundation on which to build. When one considers the amazing progress of science in its relation to medicine during the last thirty years, and the enormous mass of scientific material which must be made available to the modern physician, it is not surprising that the schools have tended to concern themselves more and more with this phase of the educational problem. And while they have been absolved in the difficult task of digesting and correlating new knowledge, it has been easy to overlook the fact that the application of the principles of science to the diagnosis and treatment of disease is only one limited aspect of medical practice. The practice of medicine in its broadest sense includes the whole relationship of the physician with his patient. It is an art, based to an increasing extent on the medical sciences, but comprising much that still remains outside the realm of any science. The art of medicine and the science of medicine are not antagonistic but supplementary to each other. There is no more contradiction between the science of medicine and the art of medicine than between the science of aeronautics and the art of flying. Good practice presupposes an understanding of the sciences which contribut to the structure of modern medicine, but it is obvious that sound professional training should include a much broader equipment.

The problem that I wish to consider, therefore, is whether this larger view of the profession cannot be approached even under the conditions imposed by the present curriculum of the medical school. Can the practitioner's art be grafted on the main trunk of the fundamental sciences in such a way that there shall arise a symmetrical growth, like an expanding tree, the leaves of which may be for the "healing of the nations"?

One who speaks of the care of patients is naturally thinking about circumstances as they exist in the practice of medicine; but the teacher who is attempting to train medical students is immediately confronted by the fact that, even if he would, he cannot make the conditions under which he has to teach clinical medicine exactly similar to those of actual practice.

The primary difficulty is that instruction has to be carried out largely in the wards and dispensaries of hospitals rather than in the patient's home and the physician's office. Now the essence of the practice of medicine is that it is an intensely personal matter, and one of the chief differences between private practice and hospital practice is that the latter always tends to become impersonal. At first sight this may not appear to be a very vital point, but it is, as a matter of fact, the crux of the whole situation. The treatment of a disease may be entirely impersonal; the care of a patient must be completely personal. The significance of the intimate personal relationship between physician and patient cannot be too strongly emphasized, for in an extraordinarily large number of cases both diagnosis and treatment are directly dependent on it, and the failure of the young physician to establish this relationship accounts for much of his ineffectiveness in the care of patients.

Instruction in Treatment of Disease

Hospitals, like other institutions founded with the highest ideals, are apt to deteriorate into dehumanized machines, and even the physician who has the patient's welfare most at heart finds that pressure of work forces him to give most of his attention to the critically sick and to those whose diseases are a menace to the public health. In such cases he must first treat the specific disease, and there then remains little time in which to cultivate more than a superficial personal contact with the patients. Moreover, the circumstances under which the physician sees the patient are not wholly favorable to the establishment of the intimate personal relationship that exists in private practice, for one of the outstanding features of hospitalization is that it completely removes the patient from his accustomed environment. This may, of course, be entirely desirable, and one of the main reasons for sending a person into the hospital is to get him away from home surroundings, which, be he rich or poor, are often unfavorable to recovery; but at the same time it is equally important for the physician to know the exact character of those surroundings.

Everybody, sick or well, is affected in one way or another, consciously or subconsciously, by the material and spiritual forces that bear on his life, and especially to the sick such forces may act as powerful stimulants or depressants. When the general practioner goes into the home of a patient, he may know the whole background of the family life from past experience; but even when he comes as a stranger he has every opportunity to find out what manner of man

his patient is, and what kind of circumstances make his life. He gets a hint of financial anxiety or of domestic incompatibility; he may find himself confronted by a querulous, exacting, self-centred patient, or by a gentle invalide overawed by a dominating family; and as he appreciates how these circumstances are reacting on the patient he dispenses sympathy, encouragement or discipline. What is spoken of as a "clinical picture" is not just a photograph of a man sick in bed; it is an impressionistic painting of the patient surrounded by his home, his work, his relations, his friends, his joys, sorrows, hopes and fears. Now, all of this background of sickness which bears so strongly on the symptomatology is liable to be lost sight of in the hospital: I say "liable to" because it is not by any means always lost sight of, and because I believe that by making a constant and conscious effort one can almost always bring it out into its proper perspective. The difficulty is that in the hospital one gets into the habit of using the oil immersion lens instead of the low power, and focuses too intently on the centre of the field.

When a patient enters a hospital, one of the first things that commonly happens to him is that he loses his personal identity. He is generally referred to, not as Henry Jones, but as "that case of mitral stenosis in the second bed on the left." There are plenty of reasons why this is so, and the point is, in itself, relatively unimportant; but the trouble is that it leads, more or less directly, to the patient being treated as a case of mitral stenosis, and not as a sick man. The disease is treated, but Henry Jones, lying awake nights while he worries about his wife and children, represents a problem that is much more complex than the pathologic physiology of mitral stenosis, and he is apt to improve very slowly unless a discerning intern happens to discover why it is that even large doses of digitalis fail to slow his heart rate. Henry happens to have heart disease, but he is not disturbed so much by dyspnea as he is by anxiety for the future, and a talk with an understanding physician who tries to make the situation clear to him, and then gets the social service worker to find a suitable occupation, does more to straighten him out than a book full of drugs and diets. Henry has an excellent example of a certain type of heart disease, and he is glad that all the staff find him interesting, for it makes him feel that they will do the best they can to cure him; but just because he is an interesting case he does not cease to be a human being with very human hopes and fears. Sickness produces an abnormally sensitive emotional state in almost every one, and in many cases the emotional state repercusses, as it were, on the organic disease. The pneumonia would probably run its course in a week, regardless of treatment, but the experienced physician knows that by quieting the cough, getting the patient to sleep, and giving a bit of encouragement, he can save his patient's strength and lift him through many distressing hours. The institutional eye tends to become focused on the lung, and it forgets that the lung is only one member of the body.

Patients Who Have "Nothing the Matter With Them."

But if teachers and students are liable to take a limited point of view even toward interesting cases of organic disease, they fall into much more serious error in their attitude toward a large group of patients who do not show objective, organic pathologic conditions, and who are generally spoken of as having "nothing the matter with them.' Up to a certain point, as long as they are regarded as diagnostic problems, they command attention; but as soon as a physician has assured himself that they do not have organic disease, he passes them over lightly.

Take the case of a young woman, for instance, who entered the hospital with a history of nausea and discomfort in the upper part of the abdomen after eating. Mrs. Brown had "suffered many things of many physicians." Each of them gave her a tonic and limited her diet. She stopped eating everything that any of her physicians advised her to omit, and is now living on a little milk with a few crackers; but her symptoms persist. The history suggests a possible gastric ulcer or gallstones, and with a proper desire to study the case thoroughly, she is given a test meal, gastric analysis and duodenal intubation, and roentgen-ray examinations are made of the gastro-intestinal tract and gallbladder. All of these diagnostic methods give negative results; that is, they do not show evidence of any structural change. The case is immediately much less interesting than if it had turned out to be a gastric ulcer with atypical symptoms. The visiting physician walks by and says, "Well, there's nothing the matter with her." The clinical clerk says, "I did an awful lot of work on that case and it turned out to be nothing at all." The intern, who wants to clear out the ward so as to make room for some interesting cases, says, "Mrs. Brown, you can send for your clothes and go home to-morrow. There really is nothing the matter with you, and fortunately you have not any of the serious troubles we suspected. We have used all the most modern and scientific methods and we find that there is no reason why you should not eat anything you want to. I'll give you a tonic to take when you go home." Same story, same colored medicine. Mrs. Brown goes home,

somewhat better for her rest in new surroundings, thinking that nurses are kind and physicians are pleasant, but that they do not seem to know much about the sort of medicine that will touch her trouble. She takes up her life and the symptoms return —and then she tries chiropractic, or perhaps it is Christian science.

It is rather fashionable to say that the modern physician has become "too scientific." Now, was it too scientific, with all the stomach tubes and blood counts and roentgen-ray examinations? Not at all. Mrs. Brown's symptoms might have been due to a gastric ulcer or to gallstones, and after such a long course it was only proper to use every method that might help to clear the diagnosis. Was it, perhaps, not scientific enough? The popular conception of a scientist as a man who works in a laboratory and who uses instruments of precision is as inaccurate as it is superficial, for a scientist is known, not by his technical processes, but by his intellectual processes; and the essence of the scientific method of thought is that it proceeds in an orderly manner toward the establishment of a truth. Now the chief criticism to be made of the way Mrs. Brown's case was handled is that the staff was contented with a half truth. The investigation of the patient was decidedly unscientific in that it stopped short of even an attempt to determine the real cause of the symptoms. As soon as organic disease could be excluded the whole problem was given up, but the symptoms persisted. Speaking candidly, the case was a medical failure in spite of the fact that the patient went home with the assurance that there was "nothing the matter" with her.

A good many "Mrs. Browns," male and female, come to hospitals, and a great many more go to private physicians. They are all characterized by the presence of symptoms that cannot be accounted for by organic disease, and they are all liable to be told that they have "nothing the matter" with them. Now my own experience as a hospital physician has been rather long and varied, and I have always found that, from my point of view, hospitals are particularly interesing and cheerful places; but I am fairly certain that, except for a few low grade morons and some poor wretches who want to get in out of the cold, there are not many people who become hospital patients unless there is something the matter with them. And, by the same token, I doubt whether there are many people, except for those stupid creatures who would rather go to the physician than go to the theatre, who spend their money on visiting private physicians, unless there is something the matter with them. In hospital and in private practice, however, one finds this same type of patient, and many physicians whom I have questioned agree in saying that, excluding cases of acute infection, approximately half of their patients complained of symptoms for which an adequate organic cause could not be discovered. Numerically, then, these patients constitute a large group, and their fees go a long way toward spreading butter on the physician's bread. Medically speaking, they are not serious cases as regards prospective death, but they are often extremely serious as regards prospective life. Their symptoms will rarely prove fatal, but their lives will be long and miserable, and they may end by nearly exhausting their families and friends. Death is not the worst thing in the world, and to help a man to a happy and useful career may be more of a service than the saving of life.

Physiologic Disturbances from Emotional Reactions.

What is the matter with all these patients? Technically, most of them come under the broad heading of the "psychoneuroses"; but for practical purposes many of them may be regarded as patients whose subjective symptoms are due to disturbances of the physiologic activity of one or more organs or systems. These symptoms may depend on an increase or a decrease of a normal function, on an abnormality of function, or merely on the subjects becoming conscious of a wholly normal function that normally goes on unnoticed; and this last conception indicates that there is a close relation between the appearance of the symptoms and the threshold of the patient's nervous reactions. The ultimate causes of these disturbances are to be found, not in any gross structural changes in the organs involved, but rather in nervous influences emanating from the emotional or intellectual life, which, directly or indirectly, affect in one way or another organs that are under either voluntary or involuntary control.

Every one has had experiences that have brought home the way in which emotional reactions affect organic functions. Some have been nauseated while anxiously waiting for an important examination to begin, and a few may even have vomited; others have been seized by an attack of diarrohea under the same circumstances. Some have had polyuria before making a speech, and others have felt thumping extrasystoles or a pounding tachycardia before a football game. Some have noticed rapid, shallow breathing when listening to a piece of bad news, and others know the type of occipital headache, with pain down the muscles of the back of the neck, that comes from nervous anxiety and fatigue.

These are all simple examples of the way that emotional reactions may upset the normal functioning of an organ. Vomiting and

diarrhoea are due to abnormalities of the motor function of the gastro-intestinal tract —one to the production of an active reversed peristalsis of the stomach and a relaxation of the cardiac sphincter, the other to hyperperistalsis of the large intestine. The polyuria is caused by vasomotor changes in renal circulation, similar in character to the vasomotor changes that take place in the peripheral vessels in blushing and blanching of the skin, and in addition there are quite possibly associated changes in the rate of blood flow and in blood pressure. Tachycardia and extrasystoles indicate that not only the rate, but also the rhythm of the heart is under a nervous control that can be demonstrated in the intact human being as well as in the experimental animal. The ventilatory function of the respiration is extraordinarily subject to nervous influences; so much so, in fact, that the study of the respiration in man is associated with peculiar difficulties. Rate, depth and rhythm or breathing are difficulties. Rate, depth and rhythm or breathing are easily upset by even minor stimuli, and in extreme cases the disturbance in total ventilation is sometimes so great that gaseous exchange becomes affected. Thus I remember an emotional young woman who developed a respiratory neurosis with deep and rapid breathing, and expired so much carbon dioxide that the symptoms of tetany ensued. The explanation of the occipital headaches and of so many pains in the muscles of the back is not entirely clear, but they appear to be associated with changes in muscular tone or with prolonged states of contraction. There is certainly a very intimate correlation between mental tenseness and muscular tenseness, and whatever methods are used to produce mental relaxation will usually cause muscular relaxation, together with relief of this type of pain. A similar condition is found in the so-called writers' cramp, in which the painful muscles of the hand result, not from manual work, but from mental work.

One might go on much further, but these few illustrations will suffice to recall the infinite number of ways in which physiologic functions may be upset by emotional stimuli, and the manner in which the resulting disturbances of function manifest themselves as symptoms. These symptoms, although obviously not due to anatomic changes, may, nevertheless, be very disturbing and distressing, and there is nothing imaginary about them. Emotional vomiting is just as real as the vomiting due to pyloric obstruction, and so-called "nervous headaches" may be as painful as if they were due to a brain tumor. Moreover, it must be remembered that symptoms based on functional disturbances may be present in a patient who has, at the same time, organic disease, and in such cases the determination of the causes of the different symptoms may be an ex tremely difficult matter. Every one accepts the relationship between the common functional symptoms and nervous reactions, for convincing evidence is to be found in the fact that under ordinary circumstances the symptoms disappear just as soon as the emotional cause has passed But what happens if the cause does not pass away? What if, instead of having to face a single three-hour examination, one has to face a life of being constantly on the rack? The emotional stimulus persists, and continues to produce the disturbances of function As with all nervous reactions, the longer the process goes on, or the more frequently it goes on, the easier it is for it to go on The unusual nervous tract becomes an established path After a time, the symptoms and the subjective discomfort that it produces come to occupy the center of the picture, and the causative factors recede into a hazy background. The patient no longer thinks "I cannot stand this life," but he says out loud, "I cannot stand this nausea and vomiting. I must go to see a stomach specialist."

Quite possibly the comment on this will be that the symptoms of such "neurotic" patients are well known, and they ought to go to a neurologist or a psychiatrist and not to an internist or a general practitioner. In an era of internal medicine, however, which takes pride in the fact that it concerns itself with the functional capacity of organs rather than with mere structural changes and which has developed so many "functional tests" of kidneys, heart, and liver, is it not rather narrow minded to limit one's interest to those disturbances of function which are based on anatomic abnormalities? There are other reasons, too, why most of these "functional" cases belong to the field of general medicine. In the first place, the differential diagnosis between organic disease and functional disturbance is often extremely difficult, and it needs the broad training in the use of general clinical and laboratory methods, which is the first step in treatment. In the second place, the patients themselves frequently prefer to go to a medical practitioner rather than to a psychiatrist, and in the long run it is probably better for them to get straightened out without having what they often consider the stigma of having been "nervous" cases. A limited number, it is true, are so refractory or so complex that the aid of the psychiatrist must be sought, but the majority can be helped by the internist without highly specialized psychologic technic, if he will appreciate the significance of functional disturbances. The physician who does take these cases seriously—one might say scientifically—has the great satisfaction of seeing some of his patients get well, not as the result of drugs or as the

result of the disease having run its course, but as the result of his own individual efforts.

Here, then, is a great group of patients in which it is not the disease, but the man or the woman who needs to be treated. In general hospital practice physicians are so concerned with training students in physical diagnosis and attempting to show them all the types of organic disease, that they do not pay as much attention as they should to the functional disorders. Many a student enters practice having hardly heard of them except in his course in psychiatry, and without the faintest conception of how large a part they will play in his future practice. At best, his method of treatment is apt to be a cheerful reassurance combined with a placebo. The successful diagnosis and treatment of these patients, however, depends almost wholly on the establishment of that intimate personal contact between physician and patient which forms the basis of private practice. Without this, it is quite impossible for the physician to get an idea of the problems and troubles that lie behind so many functional disorders. If students are to obtain any insight into this field of medicine, they must also be given opportunities to build up the same type of personal relationship with their patients.

Student's Opportunity in the Hospital.

Is there, then, anything inherent in the conditions of clinical teaching in a general hospital that makes this impossible? Can you form a personal relationship in an impersonal institution? Can you accept the fact that your patient is entirely removed from his natura. environment and then reconstruct the background of environment from the history, from the family, from a visit to the home or workshop, and from the information obtained by the social service worker? And while you are building up this environmental background, can you enter onto the same personal relationship that you ought to have in private practice? If you can do all this, and I know from experience that you can, then the study of medicine in the hospital actually becomes the practice of medicine, and the treatment of disease immediately takes its proper place in the larger problem of the care of the patient.

When a patient goes to a physician he usually has confidence that the physician is the best, or at least the best available person to help him in what is, for the time being, his most important trouble. He relies on him as on a sympathetic adviser and a wise professional counselor. When a patient goes to a hospital he has confidence in the reputation of the institution, but it is hardly necessary to add that he also hopes to come in contact with some individual who personifies the institution and will also take a human interest in him. It is obvious that the first physician to see the patient is in the strategic position—and in hospitals all students can have the satisfaction of being regarded as physicians.

Here, for instance, is a poor fellow who has just been jolted to the hospital in an ambulance. A string of questions about himself and his family have been fired at him, his valuables and even his clothes have been taken away from him, and he is wheeled into the ward on a truck, miserable, scared, defenseless and, in his nakedness, unable to run away. He is lifted into a bed, becomes conscious of the fact that he is the center of interest in the ward, wishes that he had stayed at home among friends, and, just as he is beginning to take stock of his surroundings, finds that a thermometer is being stuck under his tongue. It is a.. strange and new, and he wonders what is going to happen next. The next thing that does happen is that a man in a long white coat sits down by his bedside, and starts to talk to him. Now it happens that according to our system of clinical instruction that man is usually a medical student. Do you see what an opportunity you have? The foundation of your whole relation with that patient is laid in those first few minutes of contact, just as happens in private practice. Here is a worried, lonely, suffering man, and if you begin by approaching him with sympathy, tact, and consideration, you get his confidence and he becomes your patient. Interns and visiting physicians may come and go, and the hierarchy gives them a precedence, but if you make the most of your opportunities he will regard you as his personal physician, and all the rest as mere consultants. Of course, you must not drop him after you have taken the history and made your physical examination. Once your relationship with him has been established, you must foster it by every means. Watch his condition closely and he will see that you are alert professionally. Make time to have little talks with him—and these talks need not always be about his symptoms. Remember that you want to know him as a man, and this means you must know about his family and friends, his work and his play. What kind of a person is he—cheerful, depressed, introspective, careless, conscientious, mentally keen or dull? Look out for all the little things that you can do for his comfort. These, too, are a part of "the care of the patient." Some of them will fall technically in the field of "nursing," but you will always be profoundly grateful for any nursing technic that you have acquired. It is worth your while to get the nurse to teach you the right way to feed a patient, change the bed, or give a bed pan. Do you know the practical tricks that make a dyspeptic patient comfortable? Assume some respon-

sibility for these apparently minor points and you will find that it is when you are doing some such friendly service rather than when you are a formal questioner, that the patient suddenly starts to unburden himself, and a flood of light is thrown on the situation.

Meantime, of course, you will have been active along strictly medical lines, and by the time your clinical and laboratory examinations are completed you will be surprised at how intimately you know your patient, not only as an interesting case, but also as a sick human being. And everything you have picked up about him will be of value in the subsequent handling of the situation. Suppose, for instance, you find conclusive evidence that his symptoms are due to organic disease, say to a gastric ulcer. As soon as you face the problem of laying out his regimen you find that it is one thing to write an examination paper on the treatment of gastric ulcer and quite another thing to treat John Smith who happens to have a gastric ulcer. You want to begin by giving him rest in bed and a special diet for eight weeks. Rest means both nerves and physical rest. Can he get it best at home or in the hospital? What are the conditions at home? If you keep him in the hospital, it is probably good for him to see certain people, and bad for him to see others. He has business problems that must be considered. What kind of a compromise can you make on them? How about the financial implications of eight weeks in bed followed by a period of convalescence? Is it, on the whole, wiser to try a strict regimen for a shorter period, and, if he does not improve, take up the question of operation sooner than is in general advisable? These, and many similar problems arise in the course of the treatment of almost every patient, and they have to be looked at, not from the abstract point of view of the treatment of the disease, but from the concrete point of view of the care of the individual.

Suppose, on the other hand, that all your clinical and laboratory examinations turn out entirely negative as far as revealing any evidence of organic disease is concerned. Then you are in the difficult position of not having discovered the explanation of the patient's symptoms. You have merely assured yourself that certain conditions are not present. Of course, the first thing you have to consider is whether these symptoms are the result of organic disease in such an early stage that you cannot definitely recognize it. This problem is often extremely perplexing, requiring great clinical experience for its solution, and often you will be forced to fall back on time in which to watch developments. If, however, you finally exclude recognizable organic disease, and the probability of early or very slight organic disease, it becomes necessary to consider whether the symptomatology may be due to a functional disorder which is caused by nervous or emotional influences. You know a good deal about the personal life of your patient by this time, but perhaps there is nothing that stands out as an obvious etiologic factor, and it becomes necessary to sit down for a long, intimate talk with him to discover what has remained hidden.

Sometimes it is well to explain to the patient, by obvious examples, how it is that emotional states may bring about symptoms similar to his own, so that he will understand what you are driving at and will cooperate with you. Often the best way is to go back to the very beginning and try to find out the circumstances of the patient's life at the time. The symptoms and cause may have been simpler and more direct at the onset, at least in the patient's mind, for as time goes on, and the symptoms become more pronounced and distressing, there is a natural tendency for the symptoms to occupy so much of the foreground of the picture that the background is completely obliterated. Sorrow, disappointment, anxiety, self-distrust, thwarted ideals or ambitions in social life, business or personal life, and particularly what are called maladaptations to these conditions—these are among the commonest and simplest factors that initiate and perpetuate the functional disturbances. Perhaps you will find that the digestive disturbances began at the time the patient was in serious financial difficulties, and they have recurred whenever he is worried about money matters. Or you may find that ten years ago a physician told the patient he had heart disease, cautioning him "not to worry about it." For ten years the patient has never mentioned the subject, but he has avoided every exertion, and has lived with the idea that sudden death was in store for him. You will find that physicians, by wrong diagnoses and ill-considered statements, are responsible for many a wrecked life, and you will discover that it is much easier to make a wrong diagnoses than it is to unmake it. Or, again, you may find that the pain in th's woman's back made its appearance when she first felt her domestic unhappiness, and that this man's headaches have been associated, not with long hours of work, but with a constant depression due to unfulfilled ambitions. The causes are manifold and the manifestations protean. Sometimes the mechanism of cause and effect is obvious; sometimes it becomes apparent only after a very tangled skein has been unraveled.

If the establishment of an intimate personal relationship is necessary in the diagnosis of functional disturbances, it becomes doubly necessary in their treatment. Unless there is complete confidence in the sym-

pathetic understanding of the physician as well as in his professional skill, very little can be accomplished; but granted that you have been able to get close enough to the patient to discover the cause of the trouble, you will find that a general hospital is not at all an impossible place for the treatment of functional disturbances. The hospital has, indeed, the advantage that the entire reputation of the institution, and all that it represents in the way of facilities for diagnosis and treatment, go to enhance the confidence which the patient has in the individual physician who represents it. This gives the very young physician a hold on his patients that he could scarcely hope to have without its support. Another advantage is that the hospital patients are removed from their usual environment, for the treatment of functional disturbances is often easier when patients are away from friends, relatives, home, work and, indeed, everything that is associated with their daily life. It is true that in a public ward one cannot obtain complete isolation in the sense that this is a part of the Weir Mitchell treatment, but the main object is accomplished if one has obtained the psychologic effect of isolation which comes with an entirely new and unaccustomed atmosphere. The conditions, therefore, under which you, as students, come into contact with patients with functional disturbances are not wholly unfavorable, and with very little effort they can be made to simulate closely the conditions in private practice.

It is not my purpose, however, to go into a discussion of the methods of treating functional disturbances, and I have dwelt on the subject only because these cases illustrate so clearly the vital importance of the personal relationship between physician and patient in the practice of medicine. In all your patients whose symptoms are of functional origin, the whole problem of diagnosis and treatment depends on your insight into the patient's character and personal life, and in every case of organic disease there are complex interactions between the pathologic processes and the intellectual processes which you must appreciate and consider if you would be a wise clinician. There are moments, of course, in cases of serious illness when you will think solely of the disease and its treatment; but when the corner is turned and the immediate crisis is passed, you must give your attention to the patient. Disease in man is never exactly the same as disease in an experimental animal, for in man the disease at once affects and is affected by what we call the emotional life. Thus, the physician who attempts to take care of a patient while he neglects this factor is as unscientific as the investigator who neglects to control all the conditions that may affect his experiment. The good physician knows his patients through and through, and his knowledge is bought dearly. Time, sympathy and understanding must be lavishly dispensed, but the reward is to be found in that personal bond which forms the greatest satisfaction of the practice of medicine. One of the essential qualities of the clinician is interest in humanity, for the secret of the care of the patient is in caring for the patient.

Fifteen Greatest Physicians of All Times

The Fifteen Greatest Physicians of All Times are named in a recent issue of "Hygeia." The names are taken from a list recently made by medical historians, in an effort to name the five greatest contributors to the advancement of medicine.

Some of these men are not really physicians, in the sense that they have practiced medicine or have obtained a medical degree. Their contributions are in fields closely related to medicine. "Hygeia's" list is as follows:

1. Hippocrates, father of modern medicine, whose school and writings formulated our knowledge of medicine.

2. Galen, who described the action of the heart valves, elevated the status of the medical profession and collected the knowledge of his time in a system of medicine which was followed by physicians for centuries.

3. Leonardo de Vinci, artist and inventor, who contributed greatly to the science of anatomy.

4. Vesalius, father of modern anatomy.

5. William Harvey, representative of the renaissance of medicine, who first described scientifically the circulation of the blood.

6. Sydenham, greatest figure in medicine of the 17th century, who

wrote excellent descriptions of several disease conditions.

7. John Hunter, father of surgery.

8. Auenbrugger, who first described the method of tapping the chest for the determination of conditions beneath the skin.

9. Laennev, who first described the use of the stethoscope for listening to sounds within the chest.

10. Pasteur, father of the conception of bacteria as the direct cause of many diseases.

11. Robert Koch, discoverer of the tubercle bacillus, who established bacteriology as a science.

12. Lister, who showed how bacterial infection may be prevented.

13, 14, 15. James Young Simpson, William Morton and Crawford Long, who first made use of anesthetics and made surgery painless.

Faculty Notes

The dates of Daffydil as previously announced have been changed to Feb. 16 and 17, the annual banquet to follow on Feb. 18.

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An open meeting of the Medical Society was held in Hart House Lecture Room on Jan. 17. T. H. Phelan Esq., K.C., made a very instructive address on the Narcotic Drug Act dealing in particular with the medico-legal aspect of the Act. Mr. Phelan's eloquent style and the good advice which he offered in respect to prescribing narcotics were well appreciated by a small but interested audience. Much discussion followed the address and many questions, were asked the speaker which served to enliven the gathering considerably. Professor Rogers also spoke, telling of several of his interesting experiences in connection with the analytical chemistry of human viscera in medico-legal cases. The role of the expert witness was dwelt upon at some length too and Professor Rogers illustrated some of the pitfalls to be avoided in giving expert testimony. Music was provided at intervals by Cliff Young and his medical orchestra. Refreshments were served in the Great Hall following the meeting.

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Another Medical At-Home passed into history on the night of January 31. The Crystal Ball Room at the King Edward Hotel was the scene of this year's premier social event in the Faculty and the dance was well in keeping with the traditional brilliance associated with the function.

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Members of the Medical Society are asked to bear in mind that nominations for society and class officers are to be made on Friday, February 17, the annual elections to follow on Friday, February 24. An attempt is being made to secure a half holiday on the latter date.

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Mr. H. R. Ziegler, president of Fifth Year, represented the Society at the annual Conversazione Dance at the Ontario Agricultural College. Mr. G. C. Large, President of the Medical Athletic Society is to attend the At-Home of the Hippocratic Society at Western University on February 10.

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Subscribers to Sick Fund are reminded that no claims can be paid till the last two weeks of the session. This is on account of the fact that all claims must be in the hands of the Committee before the available funds can be correctly proportioned. Consult your class president for any information regarding the Fund that may be desired.